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Municipalities, Small Business, and Agriculture The Challenge of Meeting Environmental Responsibilities

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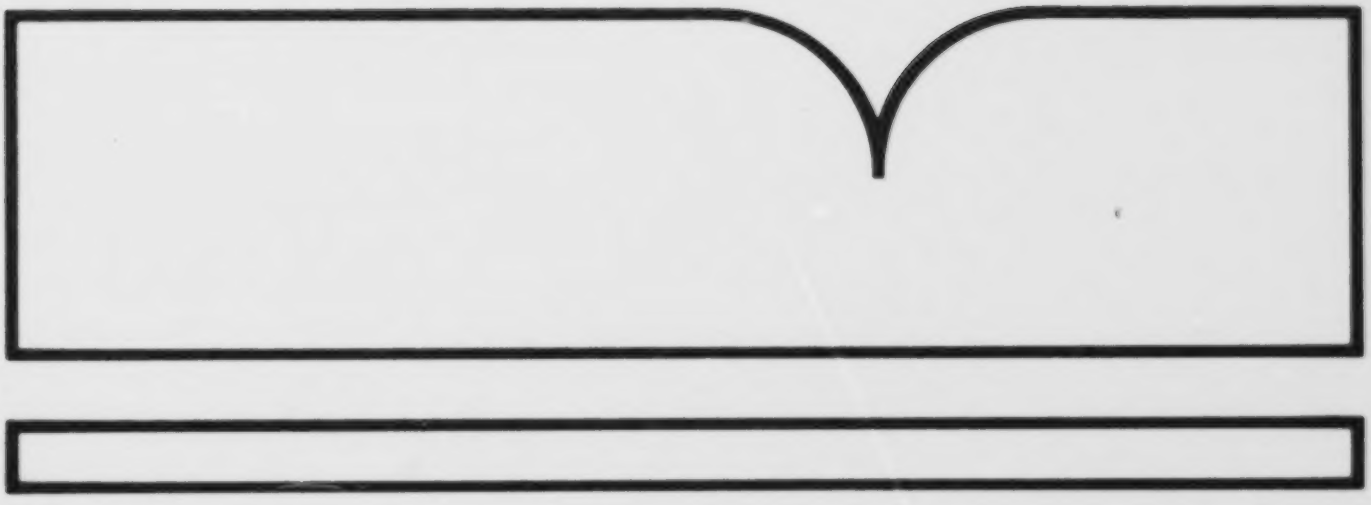

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The Administrator of the EPA requested that his staff conduct analyses of the costs of environmental controls across three different sectors of the economy -- the agricultural, small business, and municipal government sectors. The Administrator's request arose from the concern that EPA's regulation review process generally focuses on one regulation at a time. When examined individually, the impact of each regulation may be small, but the cumulative impacts may be impose excessive economic burdens upon particular groups within each of the examined sectors. The analyses were to provide a critical self-examination of the collective effects EPA proposed actions will have on each of the sectors. The regulations examined were those expected to impose new costs in the 1988-1996 time period. As this was the Agency's first attempt to examine the cumulative economic impacts of projected regulations, some of which are in the early stages of regulatory development, the findings in each study are best considered as preliminary.

This report summarizes the findings presented in each of the individual reports. In addition, it discusses the possible policy recommendations that could be considered in light of the findings of each analysis.

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Municipalities, Small Business, and Agriculture

The Challenge of Meeting Environmental Responsibilities

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MUNICIPALITIES, SMALL BUSINESS, AND AGR'CULTURE: THE CHALLENGE OF MEETING ENVIRONMENTAL RESPONSIBILITIES

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CONTENTS

		Page
	EXECUTIVE SUMMARY	i
Chapter 1	INTRODUCTION	1-1
	The Changing Nature of Environmental Regulations	1-1
	The Need for Broader Analyses	1-3
	The Sector Studies	1-3
Chapter 2	MUNICIPALITIES	2-1
	Municipalities and Environmental Regulations	2-2
	Study Methodology and Limitations	2-6
	The Impact of Environmental Regulations	2-11
	Conclusion	2-19
Chapter 3	SMALL BUSINESS	3-1
	Small Business and Environmental Regulations	3-1
	Study Methodology and Limitations	3-4
	Impacts Upon Selected Industries	3-6
	Conclusion	3-16
Chapter 4	AGRICULTURE	4-1
	Agriculture and Environmental Regulations	4-2
	Study Methodology and Limitations	4-3
	Impacts on Livestock and Major Field Crops	4-8
	Impacts on Specialty Crops	4-12
	Conclusion	4-15
Chapter 5	POLICY CONSIDERATIONS	5-1
	Municipalities	5-1
	Small Business	5-5
	Agriculture	5-8
Appendix	**Environmental Regulations Included in the Sector Studies**	

EXECUTIVE SUMMARY

Over the years, the U.S. Environmental Protection Agency's (EPA) mission has broadened considerably, and so has its reach into society. New regulations of toxic materials, hazardous substances, and solid wastes will affect hundreds of thousands of farms and small businesses, and new drinking water regulations will affect tens of thousands of small municipalities. This report summarizes the findings of three studies designed to take a first look at the combined impacts of EPA's new regulations upon municipalities, small business, and agriculture.

The sector studies examined 85 recent and forthcoming environmental regulations that have the potential for large and far reaching impacts. The costs of existing environmental regulations and all other government programs were assumed to remain constant over the study period. Although the regulations included in these studies will lead to improvements in environmental quality, the sector studies do not assess the benefits that will accrue to the municipal, small business, and agricultural sectors.

Because the sector studies were meant to be initial efforts, they are subject to a number of qualifications. For example: (1) each study limits the range of its analysis by selecting a sample of sources, and (2) the costs and even the final forms of many of the regulations studied are not yet certain. In spite of these limitations, the sector studies provide an initial reading of the potential impacts of the new environmental programs and suggest several potential policy initiatives that may prove useful.

MUNICIPALITIES

Recent revisions to environmental legislation have established a broader and more stringent set of standards to be met by municipalities. Meeting these new standards will require additional investments in capital, and increases in rates charged to customers for improved environmental services.

The potential cumulative cost of the environmental regulations examined in the municipal sector study may require that the national average household spend an additional $100 per year by 1996. Both municipalities under 2,500 persons and over 250,000 persons will experience the largest average increases in total user charges and fees paid on a per household basis, with potential average annual increases in user charges and fees of $170 and $160, respectively. Because smaller municipalities tend to have lower average household incomes and higher unit costs for improved environmental services, however, households in communities under 2,500 persons will be required to pay a greater proportion (0.7%) of their income, on average, for these services than will households in larger cities (0.5%).

Most municipalities will be able to meet the expected increases in environmental expenses and still remain financially sound. The municipalities most likely to experience difficulty will be those with populations of 2,500 or less. Between 21% and 30% of these communities may have difficulty because of the high cost of some individual regulations, the cumulative costs of recent legislative requirements, and the limited margin for expanding financial obligations in small communities due to existing demands for environmental and other infrastructure services. These difficulties are not limited to small cities, but the results suggest that a much smaller proportion (between 3% and 7%) of the cities over 2,500 persons will face financial constraints when subject to additional EPA requirements.

The individual environmental regulations that account for the largest potential increases in expenses in small communities are the drinking water and sewage treatment requirements. Several of the more costly drinking water regulations will apply to a greater proportion of smaller municipalities than larger municipalities. These regulations do not single out smaller municipalities per se, but instead deal with environmental risks that are present at smaller community water systems. Many larger water supply systems already have introduced treatment systems capable of handling some of these risks. The costs of solid waste disposal, asbestos removal in schools, and underground storage tank regulations, when totalled, also account for a significant portion of the costs borne by smaller communities.

SMALL BUSINESS

Although it might seem that EPA's 85 regulations would overwhelm any small business, the actual impacts will vary greatly. Most small businesses will not be affected directly by any of the 85 regulations. Some firms will be affected adversely by the regulations, but others -- particularly those that provide pollution control products or services -- will find that their businesses grow. Thus, the overall impact of EPA's forthcoming regulations is by no means self-evident.

An examination of statistics provided by the U.S. Small Business Administration (SBA) reveals that seventy percent of the 3.5 million small businesses in the United States are in sectors of the economy that produce little or no pollution -- wholesale and retail trade, finance, and services. Most of these businesses will not be affected directly by any of the 85 regulations. Small businesses that contribute to environmental problems will incur additional costs to comply with the regulations, however, and in some industries the costs may be high.

The small business sector study examined the impacts on small businesses in nine industries judged likely to be adversely affected by several environmental regulations. The study found that costs may be high for small businesses in three of the industries -- electroplating, wood preserving, and pesticide formulating and packaging. If costs prove to be as high as estimated and cannot be passed on to consumers, some small businesses in these industries may be forced to discontinue part of their operations or to close. Some small dry cleaners that have underground storage tanks or require substantial perchloroethylene emissions controls may also have difficulty meeting environmental requirements. In addition, certain gas stations, trucking firms, and farm supply stores with leaking underground storage tanks may face corrective action costs beyond their financial means. Small private water supply

companies are in a unique position, in that they operate as utilities and generally obtain rate increases to cover increased costs. While these firms would not be expected to go out of business, high environmental costs for water supply companies that fail to meet new drinking water standards may necessitate large increases in household usage fees. Environmental costs for one of the industries studied--photofinishing laboratories -- were found to be negligible.

The regulations that appear to be most often responsible for high costs in the industries studied are those covering the handling and reporting of toxic chemicals; the handling, treatment, and disposal of hazardous wastes; and the operation of underground storage tanks. Although cost estimates are available for only some of these regulations, those that are available indicate that the regulations will affect a large number of firms in many industries and may entail costs in the $5,000 to $10,000 range. Although these costs may be managed easily by small businesses of moderate size, they present difficulties for businesses with fewer than twenty employees. It is these very small businesses that comprise the majority of U.S. businesses.

AGRICULTURE

The objective of the agriculture sector study was to examine the cumulative effect of recent and proposed future EPA actions on the financial condition of farms in the United States. Because of the complexity of the agricultural sector and the many uncertainties that still accompany the new environmental programs, this study had to limit its focus to a few "representative" farm types and had to make many assumptions about future environmental requirements and other factors that will affect the financial condition of farms, such as farm support programs under the Food Security Act.

For livestock and major field crops, three specific farm types were examined: (1) an Illinois corn soybean farm, (2) a Mississippi cotton soybean farm, and (3) a Kansas cattle wheat farm. For specialty crops, six crops were selected: apples, tomatoes, potatoes, peas, caneberries (e.g., raspberries, blackberries, etc.), and peanuts. There proved to be insufficient information to complete the analysis for caneberries and peanuts, however, so that results are available only for apples, tomatoes, peas, and potatoes. The difficulty in obtaining information about producers of specialty crops was itself a significant finding of the study.

Three regulatory scenarios of future EPA actions were considered in the agriculture sector study, ranging from a conservative (low cost) scenario to an expansive (high cost) scenario. In addition, two alternative levels of effects were considered for each of the farms that were examined. In an average impact case it was assumed that the farm would incur the average environmental costs of all farms of that type and in a maximum impact case it was assumed that the farm would incur all of the environmental costs that a farm of that type might face. The maximum impact cases represent very unlikely worst cases, but provide an upper bound on the potential losses under each regulatory scenario.

For the three types of major field crop and livestock farms examined in this study, the effects of EPA actions on farms in different financial conditions were considered. The loss in income incurred by farms in average financial condition

under the average impact case (average environmental costs) was 3% or less under each of the regulatory scenarios considered. Losses of this magnitude resulted in only very small changes in these farms' debt to asset ratios (less than 1%). Under the unlikely maximum impact cases, farms in average financial condition experienced substantial losses in income, but were not forced out of business as a result of EPA actions.

The major field crop and livestock farms in vulnerable condition were more sensitive to increased environmental costs than their counterparts in average financial condition. Although the absolute reduction in income was similar for farms in vulnerable and average financial condition under each scenario, these losses resulted in much larger changes in the vulnerable farms' debt to asset ratios. Even though the vulnerable farms' financial conditions were found to deteriorate more than the farms in average financial condition, only one of the vulnerable farms was predicted to go out of business during the forecast period (1987-1996). The Kansas wheat cattle farm in vulnerable financial condition was predicted to go out of business even without any environmental costs and was predicted to go out of business one year earlier than it otherwise would have under one of the regulatory scenarios considered.

Because of limited data availability, the study did not forecast losses in income or changes in debt to asset ratios for specialty crop farms. Instead, it examined changes in net returns per acre (which reflect returns to land and farmer provided labor). Under the least costly regulatory scenario, the changes were generally less than 1% for farms experiencing average environmental costs and less than 8% for even the maximally affected farm. Under the most costly regulatory scenario, however, losses of the average impacted producers increased substantially, particularly for apple producers in New York and Michigan, where predicted losses were 60% and 84%, respectively. These dramatic decreases in net returns may bring about substantial structural changes in the production and markets for the crops affected. Large differences in the impact of EPA regulations on crops grown in different regions occurred because some of the proposed restrictions involve pesticides that are used in some regions and not in others. Even though the results of this study must be considered preliminary, these figures show that EPA actions could create economic problems for some specialty crop farms and suggest that the Agency exercise caution in this area.

POLICY CONSIDERATIONS

In response to the findings of these sector studies, several areas for potential policy initiatives have been suggested. While none has been endorsed by the Sector Study Steering Committee, they are presented to illustrate the kinds of activities that might be considered and to promote further discussion.

Municipalities

A number of activities have been implemented by EPA and other initiatives have been suggested to support small communities' compliance with environmental regulations. These include establishing better lines of communication among EPA, community leaders, and citizens, and extending technical and financial assistance programs, as well as several more innovative programs. Public partnerships might be

promoted, for example, to allow two or more communities to share expertise, purchase services and goods in larger volumes for discounts, or to raise capital in larger, more cost-effective blocks. Regionalization is a more structured form of partnership, in which two or more communities create a joint venture for a particular purpose, such as construction of a water supply system. Privatization, in which communities work with private companies to assist in the provision of environmental services, is another concept that might be promoted to help reduce costs.

An important finding of the municipal sector study is that not all communities are expected to face financial difficulties. This fact suggests that further analysis should be conducted in order to identify the characteristics of small and large communities that make them more likely to experience difficulty in financing and affording new environmental protection. If EPA can better identify those characteristics, then it can improve upon its current efforts to design and implement programs that will be of greatest benefit to those communities most in need of assistance.

Small Business

Because the new environmental programs cut across many industries and affect thousands of small businesses, new compliance strategies may be needed to supplement EPA's traditional enforcement efforts. Many policy initiatives are available to help small businesses learn about and comply with the new environmental regulations. These include educational programs, preparing standardized responses to paperwork and other requirements, helping to expand environmental services, and fostering new technologies. All of these potential programs can be developed with the cooperation of other government agencies and with industry trade associations.

This study has highlighted the value of detailed small business analyses and the importance of maintaining a current small business data base. The Fin/Stat data base used in this study was compiled by the SBA, but was discontinued in 1983. Although slightly out of date, the data enabled the analysis to focus on the smallest of businesses. EPA might consider working with SBA and other interested agencies to fund a common small business data base that could be used for all economic analyses, particularly the small business analyses required under the Regulatory Flexibility Act.

Agriculture

The agriculture sector study illustrates the advantages of examining the impacts of environmental regulations at the farm level as well as at the aggregate national level. While national analyses provide useful information concerning the total losses incurred by different aggregate types of farmers (e.g., corn farmers as a whole), the impact of environmental regulations on farms' financial conditions depends on the distribution of those losses among farmers and on the initial financial conditions of the affected farms. In order to determine the effect of EPA regulations on the ability of farms to survive, both aggregate and farm level analyses are necessary.

This study highlights the data and analytical requirements necessary to determine the impacts of EPA actions on agriculture. Such requirements include

accurate pesticide usage and efficacy data, improved national commodity price-quantity models, and better information on the financial and production conditions of farmers. The importance of using farm level models and improving data and modeling capabilities is likely to increase in the future as EPA tries to cost-effectively reduce environmental risks associated with agriculture.

Chapter 1

INTRODUCTION

Environmental regulations touch all sectors of society -- agriculture, business, government, and individuals. As these regulations have evolved, their impacts upon society have evolved as well.

When the U.S. Environmental Protection Agency (EPA) was founded in 1970, environmental regulation focused on the major sources of air and water pollution--principally the "smokestack" industries and large municipalities. Over the years, EPA's mission has broadened considerably, and so has its reach into society. New regulations of toxic materials, hazardous substances, and solid wastes will affect hundreds of thousands of municipalities, small businesses and farms, and new drinking water regulations will affect tens of thousands of municipalities and water supply systems.

This report summarizes the findings of three studies designed to take a first look at the combined impacts of EPA's new regulations upon municipalities, small businesses, and agriculture. Because the scope of environmental regulation is broadening to affect these sectors of society more and more, the Agency has commissioned these studies to provide an initial assessment of what economic problems, if any, can be expected to arise and to suggest areas for more detailed study.

THE CHANGING NATURE OF ENVIRONMENTAL REGULATIONS

In 1970, the most pressing environmental problems seemed obvious, and the perpetrators easy to identify. Soot and smoke from automobiles and smokestacks were fouling our air, and sewage and wastewaters from municipal and industrial outfalls were contaminating our rivers and streams. Air and water pollution regulations have done a great deal to abate these more visible forms of pollution. The air in most of our cities today is far cleaner and healthier. Thousands of miles of rivers and streams, and thousands of acres of lakes, have been restored for fishing and swimming. These accomplishments are especially impressive when seen in the context of the economic expansion and population growth that occurred during the same period. There are 25 percent more people in the United States now than 20 years ago, and our gross national product has increased by over 60 percent.

But the job is far from finished. As EPA is continuing to implement traditional environmental programs, it also is confronting new challenges. Environmental dangers from the use of toxic substances and the disposal of hazardous wastes are now a major concern. More and more contaminants are being discovered in our drinking water, so that the Agency is taking a new look at drinking water standards and is putting in place programs to protect our groundwater from pesticides and leaking underground storage tanks.

These new environmental programs present regulatory problems that in many ways are similar to traditional pollution control programs. As with existing air and water regulations, the Agency must determine how stringent standards should be and what technologies are available to meet those standards. The new programs also present some new challenges, however. One of these is assuring the compliance of the ever-increasing number of smaller and smaller sources that are covered by the new regulations. Over the past twenty years, the Agency has developed complex permit programs that govern the discharge of contaminants by large facilities. Now, EPA must establish programs that govern the activities of hundreds of thousands of small sources.

Congress recognized the fact that small sources were an important future challenge when it amended the Resource Conservation and Recovery Act (RCRA) in 1984 to include generators of relatively small volumes of hazardous waste. These amendments extended RCRA's coverage from about 15,000 facilities to over 200,000 facilities.

The underground storage tank (UST) program covers even more facilities. Literally millions of USTs are located throughout our country in every imaginable setting. Gasoline service stations operate about half of these USTs, but the remainder are operated by a diverse community, including trucking companies, dry cleaners, farm supply stores, chemical companies, local and state governments, military installations, and airports. Altogether, over 500,000 facilities are covered by the UST regulations.

The new environmental programs not only bring many new sources into the regulated community, but also bring many new regulations to bear on sources that before were regulated less intensively. Farmers, for example, once were not regulated directly, but were affected by restrictions on which pesticides they could use. Now, farmers not only are encountering more pesticide restrictions, but also must comply with new regulations covering surface water runoff, the storage and handling of pesticides and other toxic substances, and the disposal of hazardous wastes. There are over 2,000,000 farms in the United States today.

Municipalities provide an even more striking example of the broad scope of the new environmental programs. There are over 35,000 municipal governments in the United States that are covered by EPA's regulations and many more separate government jurisdictions, including water supply districts and school systems. Although local governments provide a broad range of services, the only significant environmental regulations that affected them in 1970 were those pertaining to sewers and wastewater treatment. Now, municipalities find that several of their services are governed by environmental regulations. Two services commonly provided by local governments -- waste disposal and drinking water supply -- are the primary focus of new environmental programs. In both of these areas, programs encompassing several new environmental regulations are bringing about significant changes. In addition, municipalities are required to form local planning committees to coordinate plans for dealing with hazardous substance emergencies. Even local school systems, hardly considered polluters in the conventional sense, now find that they must comply with new regulatory programs covering asbestos and radon contamination.

In today's complex environmental setting, EPA's regulatory mission is governed by major laws covering air and water pollution; radiation; the protection of drinking water; the treatment, storage, and disposal of hazardous wastes; the use of toxic chemicals and pesticides; and the storage of substances in underground tanks. Not only do EPA's environmental regulations touch every sector of American life, but each sector finds itself covered by several different kinds of environmental regulations.

THE NEED FOR BROADER ANALYSES

EPA has been analyzing the impacts of its regulations since its inception, both to provide information essential to fulfilling its statutory responsibilities and also to comply with executive orders. Each of the major environmental statutes designates different factors that EPA must consider when establishing environmental regulations. At the same time, EPA must provide regulatory analyses for review by the Office of Management and Budget (OMB). Beginning with the "Quality of Life" reviews under the Nixon Administration, the requirements for review by OMB have evolved from a relatively simple analysis of costs to the comprehensive benefit-cost analyses required for today's Regulatory Impact Analyses (RIAs).

As the analytic techniques and data sources available to EPA have improved, the regulatory analyses performed as part of the rulemaking process have become increasingly sophisticated. Their focus, however, has remained on individual environmental regulations. When one sector of society or one industry is affected by several environmental regulations, each analysis of an individual regulation paints only part of the total picture. Recognizing this, EPA from time to time has examined the combined impacts of several existing regulations on a few major industries. Furthermore, EPA's periodic Cost of Clean Air and Cost of Clean Water reports examine the overall impacts of existing environmental regulations on the entire U.S. economy. EPA has never taken a broad look at the sectors included in this report, however, nor has it taken a prospective look at the entire range of forthcoming environmental programs.

The changing nature of environmental programs has prompted many questions about their potential impacts on the various sectors of society. Will farmers, small businesses, and local governments be able to afford the combined costs of the new environmental programs? Will they be able to carry out all of the required activities? Where are problems likely to arise? To answer these questions, broader analyses are needed -- analyses that look at entire sectors of the economy, span the complete spectrum of environmental programs, and include forthcoming regulations as well as those already on the books.

THE SECTOR STUDIES

The three sector studies summarized in this report represent EPA's initial efforts to examine the overall impacts of new environmental programs on agriculture, small businesses, and municipalities. They are not meant to be exhaustive studies, and their conclusions must be regarded as tentative. Rather, they must be regarded as pilot studies intended to shed a first light on areas where potential impacts can be expected and to provide guidance for further study.

The sector studies examine 85 recent and forthcoming environmental regulations. Although EPA may issue over 200 regulations in a single year, most of these regulations are relatively minor, without broad-ranging effects. Only 5-10 of the regulations issued in a single year may be considered to be major. The 85 regulations examined are those deemed to have the potential for large and far reaching impacts. All other costs, including those of existing environmental regulations and other government programs, were assumed to remain constant over the study period.

Appendix A presents a list of the 85 environmental regulations covered in the three sector studies. Because the titles of most of these regulations are rather long, the sector studies refer to the regulations by the short titles listed in the appendix. These short titles were created for the sector studies and may differ from titles used in other EPA publications.

Because the sectors studied are fundamentally different, each study employs a different approach. The municipal study uses a newly developed model of municipal finances to determine the financial conditions of 270 randomly selected municipalities with and without the regulations. The small business study focuses on nine industries (1) that will be required to comply with a number of environmental regulations, and (2) that contain a high percentage or high number of small businesses. The agriculture study examines the impacts of environmental regulations on a selected set of livestock, major field crops, and specialty crop farms.

Because the sector studies were meant to be initial efforts, they are subject to a number of qualifications. For example:

1. Each study limits the range of its analysis by selecting a sample of sources. While the municipal study uses a random sampling process, the small business and agriculture studies focus on sources that will be most affected by the regulations. Thus, these two studies are not so much representative of the sectors studied, as they are illustrative of the heavily impacted segments of those sectors.

2. Because many of the regulations included have not yet been promulgated, the costs and even the final forms of the rules are not yet certain. Thus, the studies' conclusions about the impacts of some regulations may prove to be inaccurate, should those regulations not be promulgated in the forms assumed.

In spite of these limitations, the sector studies provide an initial reading of the potential impacts of the new environmental programs. The methodology, major limitations, and principal conclusions of each of the studies are summarized in the following three chapters. The final chapter presents a summary of the policy initiatives that have been suggested as a result of these three sector studies.

Chapter 2

MUNICIPALITIES

Municipalities play a major role in supplying environmental services. Local governments have taken responsibility for providing drinking water, sewage treatment, and waste disposal in a majority of communities. Over the past fifteen to twenty years, most of the mandates found in the federal environmental legislation enacted in the early 1970s have been met. The increase in the number of people served and improvements in the quality of local environmental services has been considerable, as has the investment in public infrastructure to meet these laws.

Recent revisions to the environmental legislation have established a broader and more stringent set of standards to be met by suppliers of environmental services. As a result, many local governments are now faced with having to maintain all or some part of their public services at a higher level of performance. To meet these new standards will require additional investments in capital, and increases in rates charged to customers for environmental services.

Improvements in environmental services is but one of several demands being made of local public infrastructure. Studies prepared on public infrastructure needs and the availability of funds to meet these needs indicate that there may be an excess demand for financial resources to rebuild and improve upon the existing stock of public infrastructure. Therefore, it is important to recognize that additional environmental requirements may have to compete with other infrastructure needs (e.g., highways, bridges), as well as other public services (e.g., police, education, health and welfare programs) provided at the local level.

Given the increasing demand for public services, this study* examines what additional investments the new environmental legislation will require local governments to undertake, and the likelihood that they will face difficulties raising the necessary funds through capital markets and revenues from customers. The economic impacts of individual future EPA actions are considered during the regulatory process in those situations permitted by environmental statutes. The unique feature of this study is its attempt to estimate the cumulative costs and impacts of meeting a combined set of EPA requirements, and to determine whether they may place a significant burden on the fiscal conditions of local governments, and require them to

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* The Municipal Sector Study - Impacts of Environmental Regulations on Municipalities; prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation by Jasbinder Singh, Raffael Stein, and Sanjay Chandra of Policy, Planning & Evaluation, Inc. and Brett Snyder of EPA; September 1988.

significantly increase existing charges for improved environmental services.

MUNICIPALITIES AND ENVIRONMENTAL REGULATIONS

Because municipalities* are a primary provider of environmental services, they are also the focus of many regulatory programs. Drinking water standards, for example, establish criteria for the quality of the water that is supplied by municipalities to their residents. Water pollution control standards establish how municipal sewage is to be treated, and solid waste regulations govern how the sludge from wastewater treatment is to be disposed. Other solid waste regulations set standards for building and operating municipal waste disposal and treatment facilities.

In addition to these environmental services, a number of other municipal activities fall under the control of environmental regulations. Most municipalities store fuel for their vehicles in underground storage tanks that are subject to EPA regulations. Schools and other public buildings must meet EPA standards for asbestos. Municipalities must also meet the requirements of new environmental regulations that govern the reporting of and emergency planning for users of toxic chemicals.

The ability of a municipality to meet the requirements of environmental regulations depends not only on which regulations it must meet, but also on its financial health and on how it organizes its environmental services. Geographic, demographic, and political factors all contribute to a municipality's decision to own, operate, and choose the level of environmental services it will provide its residents. In addition, municipalities that allocate resources to environmental services may effectively reduce expenditures for health care, welfare, and housing. Communities that reduce environmental risks may succeed in reducing medical and disability costs from pollution-related illnesses, and limit the damaging effects of pollution to the existing infrastructure (e.g., roads, bridges, buildings). As shown in Figure 2-1, the relative proportion of a municipality's budget allocated to environmental services falls as the size of the community rises. The environmental costs in the figure include annual operating and capital costs for drinking water, wastewater treatment, and solid waste disposal. Other miscellaneous expenditures associated with asbestos removal or underground storage tank technical and financial standards are not included in this figure. Therefore, these percentages may underestimate the proportion of current municipal budgets expended on all environmental services.

The top graph in Figure 2-2 shows how the average percent of household income expended on drinking water, wastewater treatment, and solid waste disposal

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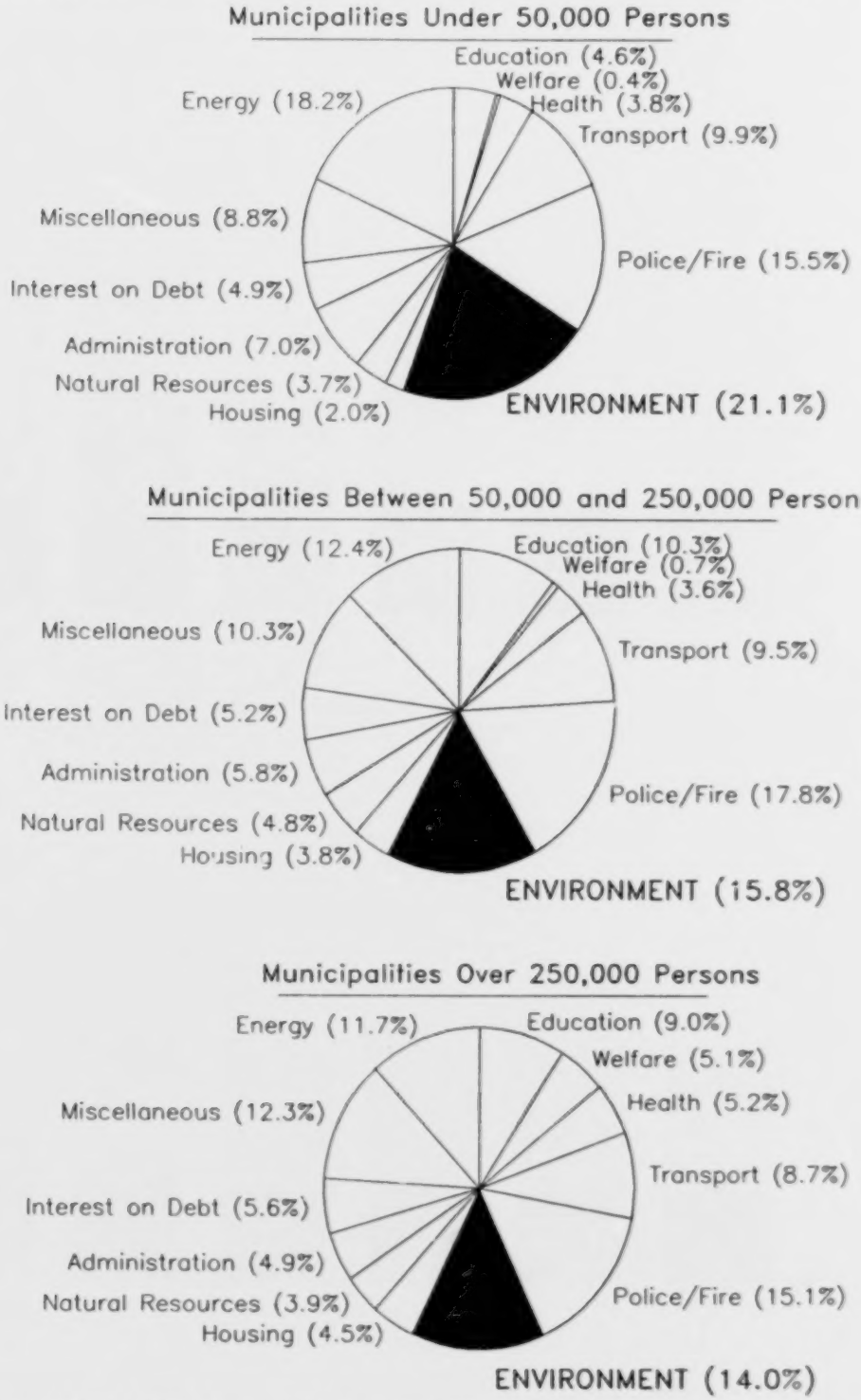
*For purposes of this study, municipalities are defined as those government bodies defined by the U.S. Bureau of the Census as municipal governments and township governments. Municipal governments are political subdivisions within which a municipal corporation has been established to provide general local government for a specific population concentration in a defined area. This includes most units designated as cities, boroughs, towns, and villages. Townships exist to serve inhabitants of areas defined without regard to population concentrations. This includes units designated as towns, plantations, locations and townships. For further discussion, see 1982 Census of Governments, Volume 1: Governmental Organization.

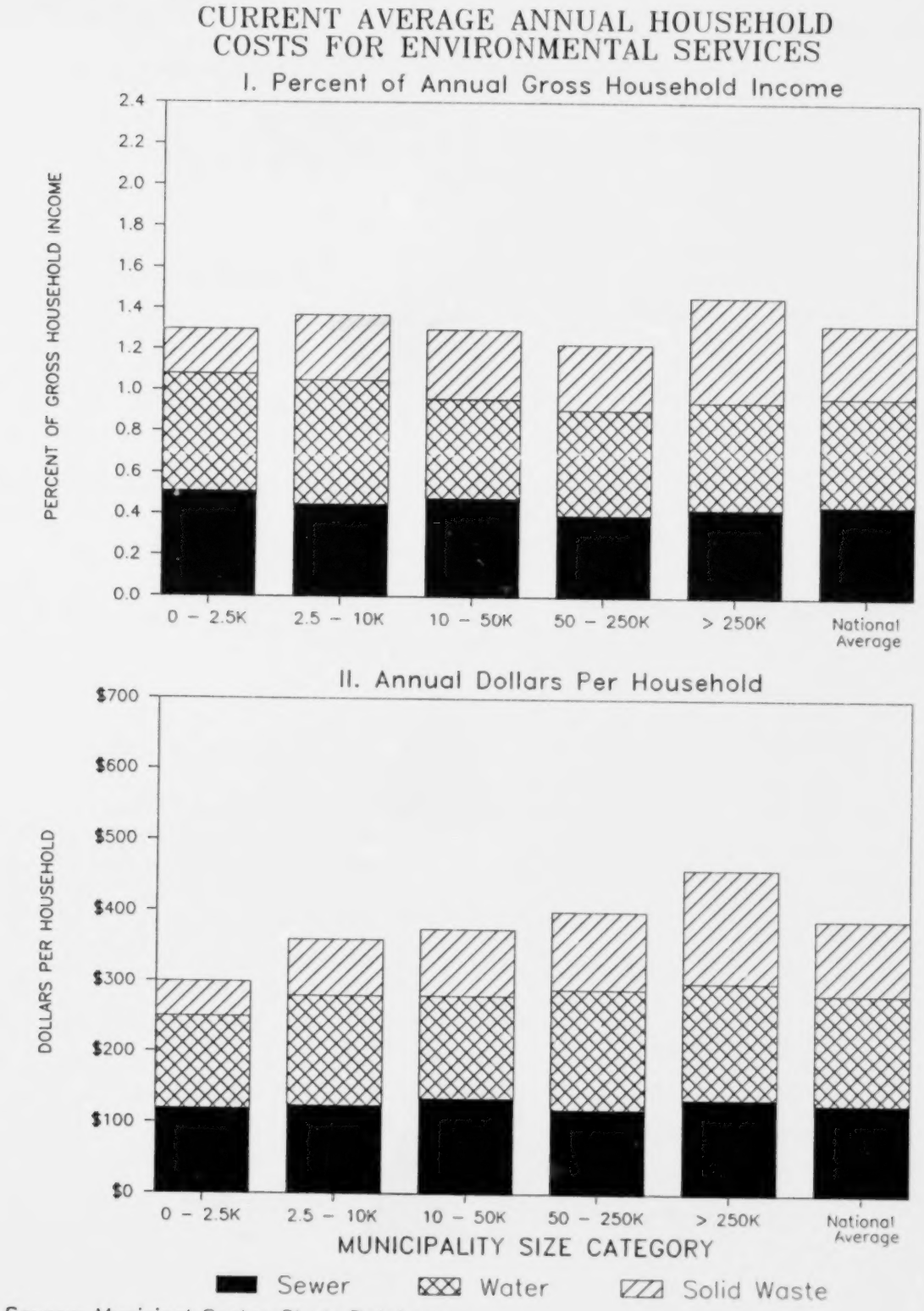
Figure 2-1

DISTRIBUTION OF MUNICIPAL EXPENDITURES FOR SERVICES IN 1984–1985



Source: 1984–1985 Census of Governments – City Finances

Figure 2-2



Source: Municipal Sector Study Database

services varies by size for municipalities sampled in the study. The lower portion of the figure shows the dollar expenditures for these same services. The differences between the two presentations is attributable to several factors. For example, the percent of household income spent for drinking water and wastewater treatment services tends to fall as municipality size increases, but dollars expended for these services remains constant or rises with population. Smaller communities tend to have lower average household incomes than do larger communities. Therefore, households in smaller municipalities must spend a larger proportion of their income than households in larger communities in order to expend equivalent dollar amounts.

For many environmental services, the ability of larger communities to take advantage of scale economies will allow them to enjoy lower unit costs for services than consumers living in smaller communities. The numbers in Figure 2-2 do not show a large decline in expenditures as population size rises. These lower unit costs are partially offset by greater consumption of these services, so the total user fees paid by households in larger municipalities can be comparable, on average, to fees paid by households in smaller communities. Grants and loans to communities have also helped to lower household costs for drinking water and wastewater treatment services, but it is not clear that the distribution of assistance has been weighted in favor of small versus large communities. An additional factor contributing to the similarity in costs across municipality sizes is the more advanced average level of services provided in larger municipalities. Larger communities have invested in more advanced and costly treatment technologies, which can offset the advantages of scale economies for comparable levels of services. The net result is that households in smaller communities generally spend a larger portion of their available resources--when measured as a percent of household income -- to obtain drinking water and wastewater treatment services than do households in larger communities.

Likewise, although scale economies may also occur in solid waste treatment, the costs in Figure 2-2 do not reflect this. The higher relative household costs of solid waste disposal for larger municipalities are primarily due to the limited number of requirements currently affecting smaller communities, and the reliance of some larger communities on more sophisticated and costly disposal techniques.

When improved environmental services are supplied by municipalities, the additional costs of raising capital to begin construction of facilities can be funded through different revenue-raising mechanisms. Current revenues, or "pay-as-you-go" financing, uses a proportion of revenues to support a capital reserve account. The revenues may come from taxes or usage fees. This method has often failed to provide for adequate reserve funds capable of financing large capital investments. Smaller communities are more likely to use this mechanism, given the amount of capital they require is often small. They are also likely to use this mechanism because they lack sufficient expertise and fiscal capacity to raise funds through bond markets.

Debt service financing involves the issuance of bonds to finance construction of large-scale projects. General obligation (g.o.) bonds are repaid with revenues raised from property or income taxes. They are best applied in situations where the general public benefits from the project, such as with public education or transportation systems. Revenue bonds are supported by the user charges assessed to customers directly benefiting from the project. Since revenue bonds rely on customer payments and g.o. bonds rely on the taxing authority of the local government, the

revenue bonds are perceived as more risky to investors and, therefore, require a higher rate of return on the amount invested. Revenue bonds can be a more accessible financing instrument than g.o. bonds, since local governments may be constrained by federal and state statutes as to the amount of debt the community can issue, or the amount it can increase tax rates. Revenue bonds are now the preferred choice of local municipalities to finance drinking water and wastewater treatment projects. There is also increasing interest in their potential use for solid waste treatment projects.

The declining availability of federal grants has contributed to the greater interest in alternative financing mechanisms. A substantial proportion of the capital investment in wastewater treatment since passage of environmental legislation in the early 1970s has been financed with federal and state grants. Grants were once a major source of capital financing for many public infrastructure programs. These programs have been reduced in favor of federal, state, and local government loan or debt financing programs. Although federal and state grants will continue into the next decade, funding levels will decline, so alternative financing mechanisms will be adopted to meet increasing demands for resources.

STUDY METHODOLOGY AND LIMITATIONS

This study examines the impacts of recent and forthcoming environmental regulations upon user charges and finances in municipalities. The outputs of the study include projections of the cumulative costs to communities of upcoming actions, the proportion of communities expected to face potential difficulties meeting the household user charge increases necessary to pay for additional requirements, and the proportion of communities that may have financial difficulties meeting the requirements given their present financial conditions.

In addition to having to use a relatively small sample of communities, the study had to rely upon a number of simplifying assumptions, including the omission of several important environmental regulations for which estimated costs are not yet available and the use of economic indicators to assess household burdens and financial capabilities of municipalities to fund improvements in environmental services.

Methodology

This study used EPA's MUNFIN model of municipal finances to calculate the effect of adding the estimated aggregate costs of environmental regulations to the current user charges and financial statistics of 270 sampled municipalities. As indicators of potential financial difficulties, the study examined several measures of the predicted increases in user fees and municipal debt. The environmental regulations considered in the sector study are listed in Table 2-1. The overall methodology is summarized below.

The study estimated the cost and the incidence rate of each environmental regulation for municipalities in each size category in order to produce "probabilities of occurrence" and the relevant associated capital, maintenance, and administrative costs. The probabilities and cost figures were used to determine the weighted average costs of each new requirement, and cumulative totals of weighted average

Table 2-1

LIST OF REGULATIONS CONSIDERED IN THE MUNICIPAL SECTOR STUDY

Regulations Included in the Cost Analysis	Regulation Status
A. Drinking Water	
1. Inorganic Compounds (IOCs)	In Development
2. Synthetic Organic Compounds (SOCs)	In Development
3. Volatile Organic Compounds (VOCs)	Promulgated
4. Fluorides	Promulgated
5. Lead and Copper Corrosion Control	Proposed
6. Lead and Copper MCL	Proposed
7. Coliform Monitoring	Proposed
8. Surface Water Treatment Rule: Filtered	Proposed
9. Surface Water Treatment Rule: Unfiltered	Proposed
10. Radionuclides	In Development
11. Disinfection	In Development
B. Wastewater Treatment	
1. Secondary Treatment of Municipal Wastewater	Promulgated
2. Pretreatment Requirements	Promulgated
3. Sewage Sludge Disposal - Technical Regulations for Use and Disposal	In Development
C. Solid Waste Disposal	
1. Municipal Landfill Subtitle D Criteria	Proposed
2. Municipal Waste Combusters - Air Standards	In Development
3. Municipal Waste Combusters - Ash Disposal	In Development
D. Miscellaneous Regulations	
1. Underground Storage Tanks - Technical Standards	Promulgated
2. Underground Storage Tanks - Financial Standards	In Development
3. Stormwater Management	In Development
4. Asbestos in Schools Rule	Promulgated
5. SARA Title III Requirements	Promulgated

Regulations Omitted from the Cost Analysis (due to insufficient data)	
A. Drinking Water	
1. Wellhead Protection Plan	In Development
2. Pesticides in Groundwater	In Development
3. Disinfection By-Products	In Development
B. Wastewater Treatment	
1. National Estuary Program	In Development
2. Wetlands Protection Program - 404(c) Permits	Promulgated
3. Nonpoint Source Regulations/Guidance/Mgmt. Plans	In Development
4. Section 304(l) - Toxics in Water Bodies	In Development
C. Solid Waste Disposal	
1. National Contingency Plan - Superfund Program	In Development
2. Low-Level Radiation Waste Standards	In Development
3. Toxicity Characteristics of Solid and Hazardous Wastes	In Development
D. Miscellaneous Regulations	
1. Heavy-Duty Diesel Vehicles	Promulgated
2. Gasoline Marketing	In Development
3. Diesel Fuel Standards	In Development
4. Revisions to National Ambient Air Quality Standards (Ozone, Carbon Monoxide, Particulate Matter, Nitrogen Oxides, Sulfur Oxides)	In Development
5. Asbestos in Public Buildings	May Be Required

costs for four service categories (i.e., drinking water, wastewater treatment, solid waste, and miscellaneous costs) were used in the analysis. The weighted average costs were used to calculate the additional charges to households for environmental services that would be in effect by 1996. These weighted average costs were examined in light of the current revenues and expenditures for environmental services in each municipality in the municipal data base. Taken together, these data bases provide current and future expenses for all environmental services. The change in total charges and fees paid by households to meet the new requirements was used as an indicator of the expected severity of the impact to households. The household burden measure used was the percentage increase in total charges and fees paid relative to current charges and fees. As there is no established limit on what this increase can or should be when addressing the degree of impact to households, the distribution of the municipalities' percentage increases is presented, and several points along the distribution are highlighted.

The study also examined the capability of each municipality to obtain financing for the additional capital expenditures required for the environmental regulations. Three financial mechanisms were addressed - revenue bonds, general obligation (g.o.) bonds, and bank loans (primarily for smaller communities excluded from bond markets).* The first stage of the financial capability analysis considered whether municipalities in the sample would have difficulty issuing a revenue bond to cover the costs of meeting additional drinking water or wastewater treatment system requirements. Their ability to meet the requirements was assumed to be contingent upon the condition that the increase in user charges to households necessary to meet additional EPA requirements will not exceed a given level of the household's gross (pre-tax) annual income. Municipalities that will be required to set user charges at levels that exceed specified ratios of current gross household income (1.0%, 1.25%, and 2.0%) are projected to have potential long-term difficulty issuing a revenue bond to finance the new requirements. Drinking water and wastewater treatment services were examined in this manner because most municipalities operate these services as enterprise units, or independent business units, which are normally supported through user charges and fees.

These thresholds are derived using information on the distribution of current user charges to households for each drinking water and wastewater treatment services. As shown in Figure 2-2, current operations require households pay approximately 0.5% of gross household income for each individual service. The thresholds set separate limits of 1.0%, 1.25%, and 2.0% for each of the drinking water and wastewater treatment services. The 1.25% threshold attempts to address the sensitivity of the results to the selection of a threshold based upon current conditions. The 2.0% threshold -- an approximate doubling of the higher observed current

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* Although municipalities under 2,500 do not normally issue revenue bonds or g.o. bonds, financial institutions will use criteria similar to those used by investment bankers in cases involving larger municipalities. To qualify small systems and municipalities for long-term loans, investment bankers will evaluate performance history, user charges (often as a percent of income), and use revenues from the service as collateral for a loan. Just as in cases where large cities are denied access to revenue bonds and g.o. bonds, so may banks refuse to approve loans to smaller municipalities where their systems or finances do not pass the criteria described in the study.

user charges for either drinking water or wastewater treatment in the sample -- is used to present the consequences of using a more relaxed criteria for households user charges.

For example, for a drinking water system to exceed the 1.0% threshold, the addition of new environmental costs to the current costs of supplying drinking water would require that average household user charges be set above 1.0% of the gross household income for the population served by the system. The same approach is followed for each of the three thresholds, and is repeated after calculating the additional environmental costs for wastewater treatment. Therefore, using the 1.0% threshold example, a municipality may find itself facing one of four possible outcomes after calculating new household user charges: (1) both drinking water and wastewater treatment costs fall below the 1.0% threshold; (2) only drinking water costs exceed the 1.0% threshold; (3) only wastewater treatment costs exceed the 1.0% threshold; and (4) both drinking water and wastewater treatment costs exceed the 1.0% threshold. If the municipality was projected to face either of the conditions described in situations (2), (3), or (4), then it was assumed that the relevant drinking water and/or wastewater treatment system would have difficulty raising capital using revenue bonds.

Costs for solid waste and miscellaneous requirements are not included in the revenue bond test due to the limited number of instances that this mechanism has been used with these "non-enterprise" services. Although more local governments are choosing to operate their solid waste services as enterprise systems, the limited number of enterprises in the sample led to the exclusion of solid waste services from the revenue bond section of the analysis.

The second stage of the financial capability analysis introduces the additional costs for solid waste disposal and miscellaneous requirements, and examines the ability of the municipality to use municipality revenues and taxing authority to finance capital requirements. For those municipalities projected to have long-term difficulty issuing revenue bonds for their drinking water and/or wastewater treatment systems, these costs are included with the solid waste and miscellaneous requirements. Where no long-term difficulties are anticipated for the drinking water and wastewater treatment services, only the solid waste and miscellaneous costs are examined against the municipality's revenue base.

The ability of a municipality to issue a g.o. bond was assumed to be contingent upon the municipality's total existing and new environmental debt service obligations relative to two measures: (1) the municipality's 1986 total general revenues, and (2) the municipality's total 1986 market value of assessed taxable property. The first condition measures existing revenue sources, whereas the second condition considers potential revenue sources. A series of threshold values were established using information on the distribution of values for the two measures from the sample of municipalities. The values were used in conjunction with the relevant environmental costs to determine which municipalities would have potential difficulty issuing g.o. bonds (or for smaller municipalities, obtaining a bank loan). A municipality had to exceed the threshold value for both measures before it was assumed to have difficulty using g.o. bonds. It is the number of municipalities having difficulty meeting these conditions that best represent the severity of the financial impacts of the additional EPA regulations considered in this study.

Limitations

Many simplifying assumptions necessary to carry out this study limit its accuracy.

The municipal data base consists of a relatively small sample of communities (270), and may not be adequate to form the basis for national estimates. In particular, the analysis may fail to adequately portray the conditions of the smallest of local governments - those under 500 persons. Furthermore, the data base was prepared from fiscal balances for only one year (1986). Because the fiscal conditions of communities continually change with the economy, the data from 1986 may not be representative of the financial conditions that will exist during the 1988-1996 period.

The cost data used in this study were taken from a limited set of EPA regulations. Although about 40 of the 85 regulations considered in the study were identified as having some implications for local government, only 22 were at a stage where cost data were available to be used in the analysis. Several of the omitted new requirements may require significant investments in local government resources (e.g., asbestos in public buildings), or may lead to major changes in current land use patterns (e.g., groundwater protection, nonpoint source guidelines). Furthermore, because some of the regulations included in the study are not yet final, the eventual costs may differ from those estimated in this study. Therefore, the results of this study cannot provide a definitive picture of what local governments will be spending by 1996 to meet EPA requirements. This study only captures a portion of the total picture, and even this portion is subject to change.

In preparing the cost data, it was assumed that small municipalities generally are served by small environmental service systems and large municipalities by large systems. The actual distribution of systems across municipalities may be different, so the costs to households may not be well represented by this method. Furthermore, to reduce the costs of environmental regulations, municipalities may change the way they provide environmental services. Municipalities may enter into regional service agreements in order to take advantage of scale economies, or they may look to private companies or contractors to provide services, thus freeing themselves of sole responsibility for financing the construction of facilities. They may also find it economical to purchase services from adjacent municipalities or special districts, rather than build new systems to supply the services themselves.

The financial indicators used to estimate households' ability to pay increased user fees and municipalities' ability to finance capital expenditures are based upon measures currently used in the financial community, but only until local governments make arrangements to raise fees or initiate bond referendum to finance new construction will the preferences of consumers be known. Consumers may be more or less willing to pay for improved environmental services than these indicators suggest. On the other hand, some municipalities may have to finance a large number of public works other than those included in this study, and consequently may encounter financial constraints even though they are not predicted to exceed the financial indicators used in the study.

THE IMPACT OF ENVIRONMENTAL REGULATIONS

The study first examined how much municipalities' expenses for environmental services would increase with the additional environmental regulations. These new expenses were then added to recent financial statistics from the 270 sample municipalities to determine whether the increased environmental expenses would cause any of the municipalities to fail the financial indicator tests.

Environmental Expenses

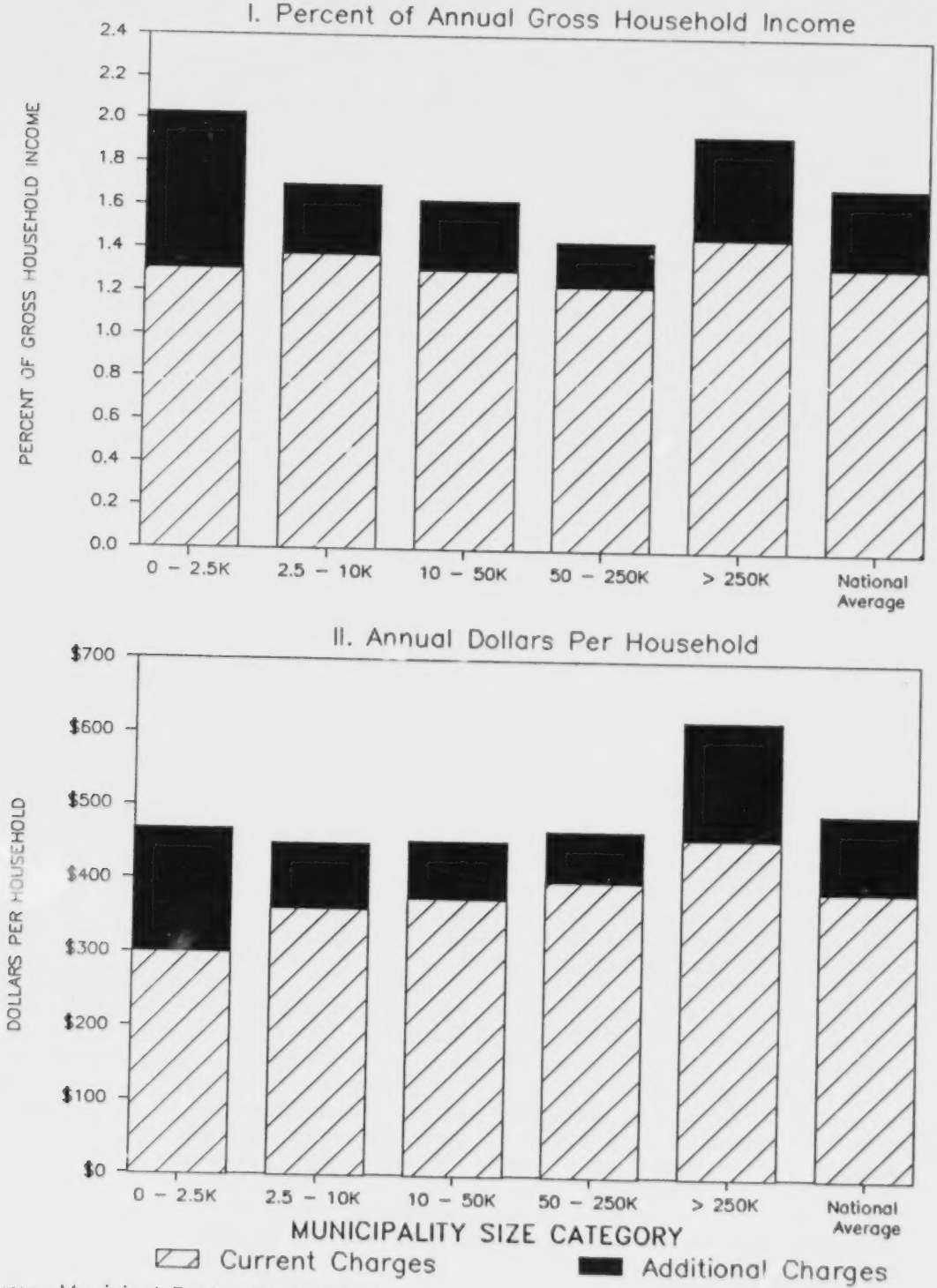
The estimated increases in environmental expenses for households in municipalities in each of five size categories is presented in Figure 2-3, both in terms of dollars per household and percent of household income. The largest potential increase in average annual costs per household will occur in communities under 2,500 persons, which will experience an increase of $170 in their annual costs. The households in communities between 2,500 and 250,000 persons will experience a smaller potential increase of $80 to $90 in their annual expenditures for environmental services. Communities over 250,000 persons may also experience large increases in costs for services. The average potential increase in annual costs for the largest communities is $160. The national average increase in annual household costs is $100.

When expressed as a percentage of household income, the greater relative increase in costs to communities under 2,500 persons is more evident. The average increase will require households in the smallest communities spend an additional 0.7% of gross household income on environmental services. Households in communities between 2,500 and 250,000 persons will spend an additional 0.2% to 0.4% of gross household income. Communities over 250,000 will spend an additional 0.5% of gross household income on environmental services. Although the average dollar increases in communities over 250,000 are comparable to average dollar increases in communities under 2,500, larger communities have higher average household income levels than do smaller communities. The potential national average increase in costs will require that an additional 0.4% of gross household income be spent on improved environmental services. Adding potential additional costs to existing environmental expenses suggests that total future dollar expenditures will be approximately the same for all but the largest municipalities. However, because household income tends to be lower in smaller communities, the percentage of household income devoted to environmental expenses will be greatest in communities under 2,500 persons, followed closely by municipalities over 250,000 persons.

The individual environmental regulations that account for the largest potential increases in expenses in small communities are the drinking water and sewage treatment requirements. Several of the more costly drinking water regulations will apply to a greater proportion of smaller municipalities than larger municipalities. These regulations do not single out smaller municipalities per se, but instead deal with environmental risks that are present at smaller community drinking water systems. Many larger water supply systems already have introduced treatment systems capable of handling some of these risks. This helps to explain why the overall increases for smaller communities exceed those for the larger communities. The costs of solid waste disposal, asbestos removal in schools, and underground storage tank regulations, when totalled, also account for a significant portion of the costs borne by smaller communities. Taken individually, these costs tend to be less

Figure 2-3

CURRENT AND POTENTIAL ADDITIONAL AVERAGE ANNUAL HOUSEHOLD COSTS FOR IMPROVED ENVIRONMENTAL SERVICES



Source: Municipal Sector Study Database

than the drinking water and wastewater treatment regulations. However, most municipalities are subject to these requirements, whereas the costlier water regulations affect a smaller proportion of municipalities. As a result, not only do the drinking water regulations lead to relatively large changes in fees in a few municipalities, but the cumulative costs of the other regulations can add up to sizable increases in user charges and fees for some municipalities.

Increases in Household User Charges - Household Burden Measures

When the costs of complying with the environmental regulations are added to existing environmental expenses, the user charges and fees of the vast majority of municipalities will increase. Some municipalities may have to raise user fees considerably above current rates. Table 2-2 presents information on the percentage of municipalities that may potentially burden households with requests for large user charge and fee increases. The percentage increases are based on a comparison of current (1986) average charges to households for existing environmental services (i.e., drinking water, wastewater treatment, and solid waste disposal) and potential future (1996) average charges for improved environmental services, once all of the additional regulations examined in the analysis are in-place. Because the study was conducted using average charges and costs of additional regulations to municipalities, the specific requirements for individual municipalities may require that some spend either more or less than the average impact results described in the study.

Most of the municipalities that would experience the largest overall percentage increases in fees are the smallest municipalities. As shown in Table 2-2, the user fees of 20% of the municipalities under 2,500 persons may rise over 100% above current levels by 1996. An additional 35% of these sized communities may find their environmental bills increase between 50% and 100%. None of the municipalities above 2,500 persons in the sample are projected to have their household costs rise by over 100%. Households in 10% of the communities between 2,500 and 10,000 persons and 20% of communities between 10,000 and 50,000 persons may find their expenses increasing between 50% and 100%. All communities in the sample between 50,000 and 250,000 persons are projected to experience less than 50% increases in household expenses for improved environmental services. Approximately 20% of the municipalities above 250,000 persons may require household expenditures rise between 50% and 100%. Although a significant number of larger communities may need to raise household fees between 50% and 100%, most households will not experience large percentage increases in costs of environmental services. Nationally, only 2% of households may have their current environmental service charges and fees rise by more than 100%, and 15% may have to pay between 50% and 100% above their current payments. Many of the households that are expected to experience initial "rate shocks" when confronted with rising user fees are in communities having fewer than 2,500 persons.

The magnitude of the rate increases suggest the extent to which problems may occur, not necessarily where rate increases will be rejected and municipalities will fail to meet required improvements in environmental quality. Efforts to inform voters of the benefits of environmental improvements can play a useful role when faced with households reluctant to accept projected increases in user fees. Furthermore, municipalities may be able to mitigate the increases in household costs by using innovative technologies or alternative methods of supplying services (e.g., regional service arrangements).

Table 2-2

POTENTIAL CUMULATIVE IMPACT OF ENVIRONMENTAL REGULATIONS: PERCENT INCREASE IN HOUSEHOLD USER CHARGES

Municipality Size Category	Number of Municipalities	Percent of Municipalities in the Category: Increase as a Percent of Current Charges* 0 - 50%	50 - 100%	> 100%
0 - 2,500	26,315	45%	35%	20%
2,500 - 10,000	6,279	90	10	0
10,000 - 50,000	2,694	80	20	0
50,000 - 250,000	463	100	0	0
> 250,000	59	80	20	0
Percent of Municipalities		56%	29%	15%
Percent of Population**		83%	15%	2%

* This percent increase is calculated as follows:

$$\frac{\text{(Additional Drinking Water + Wastewater + Solid Waste + Miscellaneous Costs)}}{\text{(Current Drinking Water + Wastewater + Solid Waste Costs)}} \times 100$$

** Percent of U.S. population living in municipalities and townships within each municipality size category. According to the 1982 Census of Governments, approximately 85% of U.S. population resides in these government organizations. Distribution is: 0-2,500 (10%); 2,500-10,000 (16%); 10,000-50,000 (29%); 50,000-250,000 (23%); > 250,000 (22%).

Capital Financing Indicators

Table 2-3 presents the percent of municipalities that may have long-term difficulties raising funds with revenue bonds because of the eventual household rates that must be charged to meet existing and potential EPA requirements. The drinking water and wastewater systems were examined using three different threshold values-- 1.0%, 1.25%, and 2.0% of gross household income. The two lower thresholds represent an effective doubling of average current user charges for each of these improved services. The 2.0% threshold -- an amount not currently expended in any municipality in the sample -- represents a more relaxed criteria of user charges expended for these services.

Some systems currently have user charges in-place that exceed the lower two income thresholds. The numbers in brackets in Table 2-3 show the estimated percentage of systems that exceed the thresholds prior to adding the costs of additional environmental requirements. These systems, as well as systems charging households rates below the thresholds, may need to raise rates further if subject to the additional requirements. Their current conditions may lead to different difficulties in obtaining financing from systems presently below the financial thresholds, and suggest different solutions may be necessary to meet their financial needs. The numbers show that a greater percentage of systems serving communities under 2,500 persons presently exceed the 1.0% and 1.25% thresholds than do systems in larger communities. These circumstances have already led EPA to initiate several programs to assist smaller communities seeking to meet environmental objectives. Several of these programs are discussed in Chapter 5.

As shown in Table 2-3, if a 1.0% threshold is used for each individual service, approximately 26% (21% above the 5% baseline failure rate) of the drinking water or wastewater systems in municipalities under 2,500 persons may have difficulties in revenue bond markets. Raising the threshold up to 1.25% of household income reduces this to 12% (10% above the 2% baseline failure rate) of systems in municipalities under 2,500 persons, and raising the threshold up to 2.0% reduces the failure rate down to 2% of systems. Larger municipality size categories will have less difficulty meeting the additional requirements. Using the 1.0% threshold measure, between 4% and 8% of the systems in municipalities with 2,500 to 250,000 persons may have difficulty in the revenue bond markets. Raising the threshold to 1.25% decreases the percent of systems failing the test to 2%. No systems in the sample serving more than 2,500 persons fail the 2.0% threshold, because none of these systems are expected to raise rates above 2.0% of gross household income.

A greater percentage of systems in municipalities over 250,000 may experience difficulties at the 1.0% threshold (11%, or 7% above the 4% baseline failure rate), but this number falls to 3% when using the 1.25% threshold, and down to zero for the 2.0% threshold. For the nation, 21% (15% above the 6% baseline failure rate) of drinking water and wastewater treatment systems may have difficulty using revenue bonds/loans when using the 1.0% threshold. The number drops to 9% (8% above the 1% baseline rate) of systems when using the 1.25% threshold, and less than 1% using the 2.0% threshold. Because most of the municipalities projected to have difficulties are small in size, the percent of persons residing in municipalities that may face each of the income thresholds is relatively smaller than the number of municipalities failing the criteria (e.g., 9 percent of households exceed the 1.0% threshold, contrasted against 21% of the municipalities).

Table 2-3

POTENTIAL IMPACT OF ENVIRONMENTAL REGULATIONS ON THE ABILITY OF DRINKING WATER AND WASTEWATER TREATMENT SYSTEMS TO ISSUE REVENUE BONDS/OBTAIN BANK LOANS IN THE LONG TERM*

Municipality Size Category	Number of Municipalities	Percent of Municipalities Whose Systems May Be Unable to Issue Revenue Bonds/Obtain Loans in the Long Term		
		User Charge/ Household Income > 1.0%	User Charge/ Household Income > 1.25%	User Charge/ Household Income > 2.0%
0 - 2,500**	26,315	26% [5%]***	12% [2%]	2% [0%]
2,500 - 10,000	6,279	8 [2]	2 [1]	0 [0]
10,000 - 50,000	2,694	7 [3]	2 [1]	0 [0]
50,000 - 250,000	463	4 [4]	0 [0]	0 [0]
> 250,000	59	11 [4]	3 [0]	0 [0]
Percent of Municipalities		21% [4%]	9% [1%]	< 1% [0%]
Percent of Population****		9%	3%	< 1%

* Long Term Revenue Bond/Loan Criteria for Drinking Water and Wastewater Services. Percent of municipalities whose new user charges for either one of the services is greater than the stated threshold value (either 1.0%, 1.25%, or 2.0% of gross household income). The model examines the financial capability of each service separately. For example, the results in the 1.0% column refers to the results of imposing a 1.0% threshold on drinking water and a 1.0% threshold on wastewater treatment services. A municipality effectively fails the threshold test if either one or both of the drinking water and wastewater treatment systems fails the 1.0% threshold. The sum of each individual service is not examined in the study because a significant number of municipalities operate these two services as separate enterprise units. For more information on thresholds, see Municipal Sector Study report.

** Smaller municipalities (under 2,500 persons) generally do not issue revenue bonds. Instead they obtain bank loans backed by user charges. The criteria used in the revenue bond tests can be applied to these smaller municipalities.

*** Percent of systems exceeding the threshold prior to incurring potential costs of additional requirements (baseline systems failing the criteria).

**** Percent of U.S. population living in municipalities and townships within each municipality size category. According to the 1982 Census of Governments, approximately 85% of U.S. population resides in these government organizations. Distribution is: 0-2,500 (10%); 2,500-10,000 (16%); 10,000-50,000 (29%); 50,000-250,000 (23%); > 250,000 (22%).

The final stage of the financial analysis takes the information from the revenue bond test and combines it with information on solid waste and miscellaneous expenses to determine if the general revenues and taxing authority of the municipality can be used to finance the additional costs to non-enterprise services and, if necessary, the enterprise services. As shown in Table 2-4, the municipalities expected to have the greatest difficulty using g.o. bonds and loans to finance additional environmental requirements are in the smaller size categories. The small municipalities will have greater difficulties meeting the solid waste and miscellaneous EPA requirements, particularly in those instances where the drinking water or wastewater system costs must also rely upon the municipality's revenue base to raise funds. Using the two different tests, between 21% and 30% of municipalities under 2,500 persons may have difficulty financing the additional EPA requirements using both revenue and g.o. bonds. The table shows that 4% to 9% of municipalities between 2,500 and 10,000 persons, and 2% to 6% of municipalities between 10,000 and 50,000 persons may have difficulty obtaining capital financing for the cumulative set of EPA requirements. Municipalities over 50,000 persons are expected to have no difficulty obtaining financing for their projected requirements.

Although omitted from the presentation in Table 2-4, the different revenue bond threshold values do not appear to play an important role in determining whether the municipality can meet its financial requirements. Using a threshold of 1.0% versus 1.25% for drinking water or wastewater treatment costs does not significantly change the number of municipalities expected to face financial difficulties. Although the selection of the income threshold in Table 2-3 significantly altered the number of systems failing the revenue bond test, the g.o. bond test results are most affected by the current financial conditions of the municipality. The information in brackets in Table 2-4 show the estimated number of municipalities exceeding the thresholds prior to adding additional environmental requirements. As many as 8% of the municipalities under 2,500 persons fail the criteria in Test I, and 12% fail the criteria using Test II. Small municipalities that have already committed themselves to large capital projects for environmental or other infrastructure needs may have to complete these projects prior to investing in new projects. Nevertheless, they will face additional costs and increasing demands on their current financial base.

In addition to the number of financially weak communities, some small municipalities currently in good financial shape may be pushed beyond the criteria. The costs of some individual requirements, or the cumulative costs of several requirements that must be met within a short period of time, may strain the financial capability of several small communities. The large increases in costs for environmental services in small municipalities may result in a significant proportion of these municipalities -- between 13% and 18% -- having financial difficulty meeting the additional EPA requirements for improved environmental services. The cumulative results indicate that between 21% and 30% of the communities in the sample under 2,500 persons may have difficulty financing the requirements.

The numbers in Table 2-4 indicate that the percentage of communities with more than 2,500 persons failing the baseline is not noticeably different from the percentage of municipalities failing the criteria after adding the costs of the additional requirements. These results suggest that the financially weaker municipalities above 2,500 persons are likely to face financial constraints, but the other communities that have sufficient financial latitude may have little difficulty meeting

Table 2-4

POTENTIAL IMPACT OF ENVIRONMENTAL REGULATIONS ON THE ABILITY OF MUNICIPALITIES TO ISSUE GENERAL OBLIGATION BONDS/OBTAIN BANK LOANS

Municipality Size Category	Number of Municipalities	Percent of Municipalities That May Fail to Issue G.O. Bonds/Obtain Loans in Each Size Category* G.O. Bond/Bank Loan Test I	G.O. Bond/Bank Loan Test II
0 - 2,500***	26,315	21% [8%]****	30% [12%]
2,500 - 10,000	6,729	4 [3]	9 [9]
10,000 - 50,000	2,694	2 [0]	6 [6]
50,000 - 250,000	463	0 [0]	0 [0]
> 250,000	59	0 [0]	0 [0]
Percent of Municipalities		16% [7%]	24% [11%]
Percent of Population****		3%	6%

* Combined G.O. Bond/Loan and Revenue Bond/Loan Thresholds: Solid waste and miscellaneous regulatory capital costs are always examined. The capital costs of drinking water and/or wastewater system requirements are included in calculating required new debt service (total capital costs) if the 1.0% Revenue Bond/Loan Threshold for either system has been exceeded. For more information on thresholds, see Municipal Sector Study report.

G.O. Bond/Loan Thresholds - percent of municipalities exceeding both of the following: (i) Current annual debt service plus new debt service expressed as a percent of current annual municipality revenues: (Test I: 20%), (Test II: 15%). (ii) Current annual debt service plus new debt service expressed as a percent of the market value of taxable property: (Test I: 0.8%), (Test II: 0.6%) Results using 1.25% and 2.0% threshold are not included because they are not significantly different from results using 1.0% threshold.

** Smaller municipalities (under 2,500 persons) generally do not issue revenue bonds or g.o. bonds. Instead they obtain bank loans that are backed by user charges. The criteria used in the two bond tests can still be applied to these smaller municipalities.

*** Percent of municipalities exceeding the threshold prior to incurring potential costs of additional requirements (Baseline municipalities failing criteria).

**** Percent of U.S. population living in municipalities and townships within each municipality size category. According to the 1982 Census of Governments, approximately 85% of U.S. population resides in these government organizations. Distribution is: 0-2,500 (10%); 2,500-10,000 (16%); 10,000-50,000 (29%); 50,000-250,000 (23%); > 250,000 (22%).

additional EPA requirements. This conclusion is, in part, contingent upon the willingness of the community to support its local drinking water or wastewater treatment systems. If the community should choose not to assist financially constrained drinking water or wastewater treatment system operations, then the number of larger systems and communities failing to obtain financing for additional environmental requirements may fall between the numbers presented in the revenue bond results of Table 2-3 and the g.o. bond results of Table 2-4.

CONCLUSION

The major findings of this study may be summarized as follows:

Household Impacts

The potential cumulative cost of regulations examined in the study that improve environmental services provided by municipalities may require that the national average household spend an additional $100 per year by 1996.

Both municipalities under 2,500 persons and over 250,000 persons will experience the largest average increases in total user charges and fees paid on a per household basis. The average potential increase in user charges and fees will be $170 and $160, respectively. Some of the more costly regulations address technologies that are in operation at most large municipalities, but have yet to be adopted by small municipalities. Also, costs per household for many regulations tend to fall as the population increases, due to economies of scale. These conditions, plus the lower average household income levels in smaller municipalities, will require that households in communities under 2,500 persons pay a greater proportion (0.7%) of their income, on average, for these services than households in larger municipalities (0.5%).

Financial Impacts

Most municipalities will be able to meet the expected increases in environmental expenses and still remain financially sound. The municipalities most likely to experience difficulty will be the municipalities with populations of 2,500 or less. Between 21% and 30% of the communities under 2,500 persons may have difficulty using revenue bonds, g.o. bonds, and loans because of the high cost of some individual regulations and the cumulative costs of recent legislative requirements (affecting between 13% and 18% of small municipalities), and the limited margin for expanding financial obligations in small communities due to existing demands for environmental and other infrastructure services (the remaining 8% to 12% of small municipalities).

These difficulties are not limited to small municipalities, but the results suggest that a much smaller proportion of the municipalities over 2,500 persons will face financial constraints when subject to additional EPA requirements. Unlike the small municipalities, most of the constrained municipalities already are in financially weak positions, given the criteria. The additional environmental requirements, on average, should not place financially strong communities into weak financial positions.

Some portion of enterprise systems serving larger municipalities, particularly those over 250,000 persons, may have difficulties financing their additional require-

ments. If the municipalities served by these systems fail to offer support to finance some portion of the requirements, these systems and municipalities may have difficulty meeting the additional capital requirements.

Because of the many simplifying assumptions required to carry out this study, care should be taken in interpreting the results. The municipal government sample database requires that caution be exercised when seeking to extrapolate results to the nation as a whole, particularly for very small systems and communities. Several of the regulations considered are not yet final, so their costs may change. Regulations likely to be important for municipalities and households were not included in the cost analysis because of insufficient information on costs and number of affected communities. Their omission may result in an underestimate of the costs to affected municipalities. On the other hand, municipalities may be able to undertake alternative means of meeting environmental objectives that are less costly than original EPA estimates.

The analysis underscores EPA's efforts to seek additional information on the finances and environmental options available for smaller municipalities. Knowing more about individual community requirements will assist EPA in better designing and modifying programs capable of dealing with their unique problems. This information may be of most value for smaller communities, as they face the potentially greatest challenges in the coming decade.

Chapter 3

SMALL BUSINESS

The United States is a nation of small businesses as much as it is a nation of large corporations. Over ninety-five percent of all businesses have fewer than 50 employees. Although these firms employ only about one quarter of the people in the United States and account for about one quarter of total sales, they are an important part of the economy and an integral part of the American way of life.

While environmental regulations affect all businesses, small businesses have their own special problems in dealing with them. Firms with only 5 or 10 employees do not have the financial resources or the legal and engineering staffs available to larger firms. Often their costs per unit of production to comply with environmental regulations are much larger than those of their large competitors.

From its inception in 1970, EPA has recognized the special problems of small businesses in dealing with environmental regulations and has taken these problems into account in its rulemaking process. Often, EPA has relaxed some environmental regulations for small businesses and, for some regulations, has exempted small businesses. EPA's Small Business Ombudsman has been appointed to represent the special needs of small businesses within the Agency.

This study* investigates the potential impact upon small businesses of the environmental regulations that will have the most effect from 1988 through 1992. The study first examines how these regulations will affect small businesses in general, and then examines in more detail the impacts upon selected industries.

SMALL BUSINESS AND ENVIRONMENTAL REGULATIONS

Although it might seem that EPA's 85 regulations would overwhelm any small business, the actual impacts will vary greatly. Many small businesses will not be affected directly by any of the 85 regulations. Some firms will be affected adversely by the regulations, but others -- particularly those that provide pollution control products or services -- will find that their businesses grow. Thus, the overall impact of EPA's forthcoming regulations is by no means self-evident.

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* The Small Business Sector Study: Impacts of Environmental Regulations on Small Business; prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation by Lyman H. Clark and E. H. Pechan & Associates, Inc.; September 1988.

Whether a small business is affected by many environmental regulations, only one regulation, or none at all depends upon whether the business contributes to environmental problems or helps to solve them. Most small businesses - for example, those in the wholesale, retail, financial, and services sectors - are relatively neutral as regards environmental problems and, hence, are not directly affected by any environmental regulations. These sectors of the economy include 70% of all small businesses.

Small businesses are adversely affected by environmental regulations when they create environmental problems that the nation has decided to address. Traditionally, the businesses associated with environmental problems have been those in the "smokestack" industries, such as mining and manufacturing -- industries that discharge pollutants into the air or waterways. The businesses adversely affected by the new regulations are those that use toxic chemicals in their processes or generate hazardous wastes. These include some industries that usually are considered to be polluting industries -- petroleum refiners, iron foundries, and electric utilities -- and other industries that generally are not regarded as polluters -- dry cleaners, gasoline service stations, and farm supply stores.

Because one firm's expenditure to comply with an environmental regulation is often another firm's receipt, many small businesses will find that the forthcoming environmental regulations create an increased demand for their products and services. Small businesses that provide engineering or laboratory services, for example, or manufacture pollution control or monitoring equipment, or clean up hazardous waste sites should be positively affected by the new environmental programs. Although this study does not examine these positive impacts, they are worthy of note as part of the total economic picture.

A list of the industries that could be either negatively or positively affected by EPA's regulations was prepared as part of the small business sector study and is presented therein. While this list is not exhaustive and was prepared using information that, in many cases, was still preliminary, it provides a representative picture of the kinds of industries that are most likely to be affected, either adversely or positively. Those industries listed most frequently as potentially adversely affected by the environmental regulations are examined in Table 3-1. They include about 3.5% of all small businesses in the United States.

Although firms with fewer than 50 employees account for 95% of all businesses, the relative importance of small businesses varies from sector to sector. Firms with fewer than 50 employees account for over half the employment and sales in some sectors - agriculture, construction, and wholesale trade - but less than 20 percent of employment and sales in other sectors - mining, manufacturing, and transportation. Thus, some sectors of the economy can be said to be "small business dominated," and others can be said to be "large business dominated." Several of the industries listed in Table 3-1 are clearly small business dominated.

Table 3-1

SMALL BUSINESSES* IN SELECTED INDUSTRIES - 1986

SIC	Industry	Number of Firms	Number of Small Businesses	Small Business Portion of Firms	Employment	Sales
2491	Wood Preserving	344	309	90%	49%	54%
2861	Gum & Wood Chemicals	70	61	87%	4%	18%
2879	Pesticide Formulators	338	307	91%	13%	14%
2911	Petroleum Refining	315	241	77%	1%	5%
3292	Asbestos Products	114	91	80%	4%	3%
3321	Gray Iron Foundries	602	370	62%	10%	11%
3341	Secondary Smelting	506	435	86%	25%	25%
3471	Electroplating	3,350	3,050	91%	56%	51%
4213	Interstate Trucking	24,608	22,656	92%	27%	30%
4911	Electric Utilities	1,376	864	62%	4%	4%
4941	Water Supply	2,109	1,977	94%	32%	28%
4953	Refuse Systems	2,868	2,742	96%	31%	30%
5191	Farm Supply Stores	15,810	15,609	99%	66%	65%
5541	Service Stations	54,930	54,077	98%	71%	62%
7216	Dry Cleaners	15,728	15,438	98%	79%	79%
7395	Photofinishing Labs	4,739	4,547	96%	42%	47%

* Includes businesses with 1-49 employees.

Source: U.S. Small Business Administration: Small Business Data Base (SBDB), United States Establishment and Enterprise Microdata (USEEM).

STUDY METHODOLOGY AND LIMITATIONS

Because the number and diversity of small businesses make it impossible to cover all small businesses in this study, the study focuses upon describing the impact of the environmental regulations upon representative small businesses in nine selected industries. The methodology has been designed to describe the environmental regulations that different types of industries will face and to provide a preliminary indication of how the costs of these regulations will compare to the financial capabilities of small businesses in each industry. This methodology necessarily limits the detail of the analysis and the accuracy of the results.

Methodology

The first step in this study was to examine the list of 85 environmental regulations to determine which industries would be most affected. These industries were then examined to determine which would be most appropriate for further study. Table 3-1 lists those industries that were found to be most affected by the environmental regulations and presents statistics on the relative importance of small businesses in each industry. Several of the industries listed in Table 3-1 were selected for further study because they have a high percentage of employment or sales accounted for by small businesses: dry cleaning, gasoline service stations, farm supply stores, electroplating, wood preserving, and photofinishing laboratories. Although small businesses do not account for a high portion of employment or sales in the interstate trucking industry, this industry was selected simply because it includes such a large number of small businesses. Two other industries, pesticide formulators and water supply companies, were selected because their environmental problems are different from those of most of the other industries on the list.

Definitions of a "small business" vary. The U.S. Small Business Administration (SBA) uses different definitions for each industrial category. For most manufacturing industries, SBA defines a small business as a firm with fewer than 500 employees (99.6% of all firms). The U.S. Occupational Safety and Health Administration (OSHA), on the other hand, defines a small business as a firm with fewer than 10 employees (75.4% of all firms). Most of the statistics presented in this sector study focus on businesses with fewer than 50 employees (95.3% of all firms). While this definition is somewhat arbitrary, it in no way affects the conclusions of the study. Whatever the definition used, most businesses are small, and the number of small businesses is about 3.5 million.

The approach used in analyzing each of these industries selected may be outlined as follows:

1. Describe a "typical" small business in the industry.

2. Identify the environmental "problems" associated with small businesses in the industry.

3. Identify the environmental regulations that will apply to these small businesses, and estimate the associated compliance costs.

4. Estimate the paperwork costs associated with the environmental requirements for each industry.

5. Compare the estimated compliance costs, including the paperwork burden, with industry financial statistics to determine whether small businesses might be expected to have difficulty meeting environmental requirements. Where the estimated annual cost of compliance was found to exceed 30% of net profits and/or where the estimated capital costs were found to exceed 30% of equity, then small businesses in the industry were identified as having the potential for financial difficulties.

The threshold value of 30% was selected on more or less an arbitrary basis. Time and data limitations prevented any extensive financial modeling or detailed analysis of potential business impacts. This study was designed, instead, to identify potential problem areas. When estimated environmental costs exceed 30% of the median small business's annual net profits and/or estimated capital costs exceed 30% of the median equity, then there seems to be cause for concern. Small businesses in some industries may be able to pass such costs on to their customers and others may be able to reduce the costs through innovative techniques. Some of the costs will be absorbed by reduced taxes. There are a variety of ways that businesses may adjust to increased costs. Nevertheless, when it appears that increased costs in any size category of any industry may exceed 30% of profits, it is safe to say that the potential for financial difficulties exists. Because the study examined the financial statistics of both the median firm in each size category and the firm at the lowest quartile level, the results of the analysis are not particularly sensitive to the 30% threshold value. When costs were close to 30% for the median firm, they were well in excess of 30% for the firm at the lowest quartile.

This study did not address the issue of whether small businesses will be able to pass increased environmental costs on to their customers in the form of higher prices. While economic theory suggests that prices in an industry should rise to reflect producers' costs, such adjustments may take time and may be inhibited by competition from substitute or imported products or simply by consumer resistance. Furthermore, the increased costs experienced by small businesses may be greater than industry averages. Predicting the price increases that might result from increased environmental costs is a complex exercise that is beyond the scope of this study.

Exceptions to the general methodology were made for two industries: gasoline service stations and private water supply systems. The analysis of gasoline service stations was based upon a financial model developed for EPA's Office of Underground Storage Tanks. The analysis of private water supply systems was provided by EPA's Office of Drinking Water based upon its surveys of water supply systems.

For information on the financial condition of small businesses, this study used the 1976-1983 Fin/Stat file compiled by the SBA. This is the only data base that provides separate statistics for many different sizes of businesses, including those that have fewer than 10 employees. Because the estimates of environmental costs often were available only for an "average" small business, it was not possible to conduct detailed financial analyses on businesses of each size category. Using the

Fin/Stat file made it possible, however, to examine the financial capabilities of firms of different sizes and to identify potential problem areas.

Although 1976-1983 financial data is slightly outdated, inflation from 1983 to the end of 1987 was relatively low, about 16%. This is well within the range of accuracy of the other data used in the study and within the normal year-to-year fluctuations in the Fin/Stat data. The average (median) dry cleaner in the Fin/Stat file had lower net profits in 1983 ($12,000) than in 1977 ($14,900), for example, even though the inflation over that period was almost 64%.

Limitations

The approach used in this study has several limitations. For example:

1. Many of the regulations included in the study are not yet final. One of the major environmental regulations affecting electroplaters -- for example, the hexavalent chromium air emission standard -- is not available yet in even a preliminary form, and one of the regulations affecting dry cleaners -- the perchloroethylene air emission standard -- is still under formulation with many options under study. Thus, the eventual costs and impacts of many regulations may vary considerably from those indicated herein.

2. The performances of individual small businesses differ considerably from industry averages. Although this study attempts to take this into account in a qualitative way, the study cannot go so far as to say how many small businesses might experience difficulties in any industry.

3. The data used in the study, including both the estimates of environmental costs and the business financial statistics, are of limited accuracy. Thus, the conclusions must be regarded as preliminary.

In spite of these unavoidable limitations, the study provides an initial description of how environmental regulations will affect small businesses and identifies many potential policy issues and problem areas for further study.

IMPACTS UPON SELECTED INDUSTRIES

Table 3-2 summarizes the results of the industry analyses. The study found that costs may be high for most small businesses in three of the industries--electroplating, wood preserving, and pesticide formulating and packaging. If costs prove to be as high as estimated and cannot be passed on to consumers, some of these small businesses may be forced to discontinue part of their operations or to close. Costs also may be high for small businesses in certain segments of five other industries. Some small dry cleaners that have underground storage tanks or require substantial perchloroethylene emissions controls may have difficulty meeting

Table 3-2

SUMMARY OF IMPACTS UPON SELECTED INDUSTRIES

Industry	Most Significant Regulations	Firms That Might Experience Difficulty
Electroplating	Toxic Chemicals Hazardous Waste Chromium Emissions*	Firms with 1-49 employees
Wood Preserving	Hazardous Waste Toxic Chemicals Corrective Action Stormwater Control*	Firms with 1-49 employees
Pesticide Formulating and Packaging	Toxic Chemicals Hazardous Waste	Firms with 10-19 employees
Farm Supply Stores	Pesticides UST Standards UST Corrective Action	Firms with leaking underground storage tanks
Interstate Trucking	UST Standards UST Corrective Action	Firms with leaking underground storage tanks
Gasoline Service Stations	UST Standards UST Corrective Action Hazardous Waste	Firms with leaking underground storage tanks
Dry Cleaning	UST Standards UST Corrective Action Hazardous Waste Perc Emissions*	Firms with 1-9 employees that have USTs or require perc emissions controls
Photofinishing Laboratories	None	None
Water Supply	Drinking Water Standards	Firms that serve fewer than 2,500 people

* These regulations are still being formulated.

environmental requirements. In addition, certain gas stations, trucking firms, and farm supply stores with leaking underground storage tanks may face corrective action costs beyond their financial means. Small private water supply companies are in a unique position, in that they operate as utilities and generally obtain rate increases to cover their increased costs. While these firms would not be expected to go out of business, high treatment costs for water supply companies that fail to meet new drinking water standards may necessitate large increases in household usage fees. Environmental costs for one of the industries studied -- photofinishing laboratories-- were found to be negligible.

The environmental regulations that appear to be most often responsible for high costs in the industries studied are those covering the handling and reporting of toxic chemicals; the handling, treatment, and disposal of hazardous wastes; and the operation of underground storage tanks. Although costs estimates are available for only some of these regulations, those that are available indicate that the regulations will affect a large number of firms in many industries and may entail costs in the $5,000 to $10,000 range. While these costs may be managed easily by small businesses of moderate size, they present difficulties for the smallest of the small businesses. It is these very small businesses that comprise the majority of U.S. businesses.

The following sections briefly describe the results of the analyses for each industry.

Electroplating

The electroplating process requires the use of many toxic and hazardous materials, such as metals and solvents. Although electroplaters generally reclaim and recycle these materials, many of which are valuable, some of the toxic materials remain in electroplating wastewaters and solid wastes. In addition to these problems associated with hazardous wastes, electroplaters that use chromium may also have a problem with hazardous air emissions.

Most of the environmental expenditures for electroplaters over the next few years will have to do with handling and disposing of the sludge that is generated by these wastewater treatment systems and with the recordkeeping and reporting that will become a necessary part of handling toxic substances and hazardous wastes. One other potential expenditure -- emission controls for hexavalent chromium -- will apply only to the chrome plating segment of the industry.

Because electroplaters with fewer than 10 employees will be exempt from Section 313 of SARA Title III, their additional costs for the 1988-1992 period will be approximately $4,430 per year, with an additional cost of approximately $3,680 in the first year for the hazardous waste generator regulations. The estimated annual costs amount to about 32% of the median small electroplater's net profit and the additional first year costs amount to about 7% of their equity. Electroplaters at the lowest quartile of this size category averaged net profits of only $3,400 over the 1976-1983 period and lost $9,100 in 1983. Although the additional first year expenses amount to only 15% of their equity, the $4,430 in additional environmental expenses amounts to 130% of their net profits over the 1976-1983 period. These figures suggest that the electroplaters in this size category may experience difficulty managing the

increased environmental costs. Because the $4,430 in annual expenses represents only about 2% of their average sales, it seems probable that many of these electroplaters will be able to adjust to the increased costs, but for some marginal electroplaters the additional expenses could present financial difficulties.

The relative impact of environmental regulations during the 1988-1992 period will be greatest on electroplaters with 10-19 employees. These are the smallest electroplaters that will be subject to Section 313 of SARA Title III. Section 313 may add $9,000 to these electroplater's annual costs, with an additional $3,000 in the first year. This $9,000 plus $4,430 of other expenses amounts to over 70% of the median electroplater's 1976-1983 net profits. Electroplaters at the lowest quartile in this size category averaged net profits of only $3,400 over the 1976-1983 period and lost $4,300 in 1983. The estimated environmental costs would amount to almost 400% of their average net profits. These figures suggest that many electroplaters with 10-19 employees will have difficulty meeting the costs of the environmental regulations.

Electroplaters in the next size category, 20-49 employees, may also experience some difficulty meeting the environmental requirements. Their costs will be approximately the same as those of the smaller electroplaters, and even though they have a larger annual profits, the annual costs are still relatively high. The median electroplater in this size category had net profits over 1976-1983 of $34,000 on equity of $228,000. The estimated annual environmental expenses of $13,430 amounts to 40% of their average 1976-1983 net profits. Electroplaters at the lowest quartile level averaged net profits of only $9,000 over 1976-1983 and experienced a $15,200 loss in 1983. The estimated environmental costs amount to almost 150% of their average net profits. Thus, some electroplaters in this size category also may have difficulty meeting the environmental requirements.

It is only in the next largest size category of 50-99 employees that the environmental expenses amount to less than 30% of the median electroplaters' net profits ($70,000). The electroplaters in the lowest quartile averaged net profits of $40,000, however, so that the estimated environmental costs amount to approximately 34% of these electroplater's annual net profits. Thus, the increased expenses will be high for some of the firms even in this larger size category.

Wood Preserving

Almost all of the substances and chemicals used at a wood preserving facility are considered toxic or hazardous. In previous years, as the industry was developing, and environmental concerns were not an issue, the practices of many wood preserving facilities eventually contributed to serious contamination of the surrounding area's soil and water. Many of these facilities have had to implement extensive cleanup operations to correct these problems. The cleanup costs have strained the financial resources of many firms severely, and several firms have gone bankrupt.

Over the period 1988-1992, the cleanup of wood preserving facilities will continue, and wood preservers will be faced with new regulations governing the disposal of their hazardous wastes, the reporting of toxic chemicals, and the control of stormwater flows. The problems associated with these new regulations may involve not only increased costs, but also the unavailability of disposal sites. Wood

preservers now are finding that there are no disposal alternatives available for their pentachlorophenol wastes.

Management and reporting of hazardous wastes and toxic chemicals will add approximately $14,300 in annual costs to wood preservers' environmental expenses. These costs amount to about 32% of the 1976-1983 median net profits for wood preservers in both the 10-19 and 20-49 employee size category, and over four times the reported 1983 net profits. In addition to these costs, some potentially large costs of forthcoming waste disposal regulations and potentially large capital costs associated with waste-minimizing technologies have not been included in the estimates. These figures all suggest that some wood preservers may have great difficulty meeting environmental expenses.

In addition to these increased annual costs, wood preservers may incur major construction costs to control stormwater. Although these regulations are still in the formative stages, the costs of some of the principal regulatory alternatives, such as constructing roofs or wastewater collection systems for storage yards, have been estimated to be $200,000 even for small facilities. Capital costs of this magnitude amount to 150% of the median equity of wood preservers with fewer than 10 employees, and about 80% of the median equity of those with 10-19 employees. Should costs prove to be as high as the preliminary estimates indicate, small wood preservers would find it very difficult to meet these requirements.

Pesticide Formulating and Packaging

Pesticide formulating and packaging (PFP) firms handle many materials that are considered toxic and may present an environmental danger if spilled. Similarly, many of the wastes generated from PFP processes are considered hazardous. Process wastewaters from PFP firms may be contaminated with the toxic substances used and/or with the hazardous wastes generated. Finally, the pesticides produced by these firms are themselves dangerous and subject to stringent labeling and handling requirements.

The environmental regulations that will affect PFP firms directly during the period 1988-1992 include those concerned with the handling of toxic substances and hazardous wastes as well as those governing the handling and labeling of pesticides. The PFP plants that currently discharge wastewaters into municipal sewers also will be subject to categorical pretreatment standards at some time in the future.

The smallest PFP firms, those with 1-9 employees, will be exempt from the most costly regulation, Section 313 of SARA Title III, and will have annual costs of only $2,560. These firms should have no difficulty meeting environmental requirements. PFP firms with 10 or more employees will have to comply with Section 313 of SARA Title III and will face costs of $11,560 per year plus increased waste disposal costs and an additional $6,680 in the first year of regulation. They also may have to replace some of their labels at a cost of $1,000-$2,000 each. Although the capital costs are relatively low, the annual costs are about 37% of median net profits of PFP firms with 10-19 employees, and about 200% of the net profits of firms at the lowest quartile level. These figures suggest that some PFP firms with 10-19 employees may have difficulty meeting the requirements. Unlike firms in other industries, small PFP firms may have the option of discontinuing some of their operations rather than

closing, if they cannot afford to meet these environmental requirements.

PFP firms will be subject not only to the current and forthcoming regulations that are covered in this study, but also to the continuation of and possible changes in the many existing regulations that govern the manufacture, distribution, and use of pesticides. Firms in the pesticide industry are subject to many environmental product regulations as well as regulations governing the discharge and disposal of residuals. Regulations governing the registration and labeling of pesticides, for example, already are a major factor in the PFP industry. EPA is considering changing many of these existing regulations, which may have a more profound effect on the PFP industry than the regulations covered in this study.

Farm Supply Stores

Many farm supply stores handle pesticides, with the resultant environmental dangers in possible spillage. For those firms that offer pesticide application services, the mixing and use of these pesticides require stringent handling procedures so as not to contaminate the environment. In addition, those farm supply stores that provide fuels are concerned with potential spills and leaks from underground storage tanks containing gasoline or diesel fuel.

Which environmental regulations affect farm supply stores directly depends upon whether the stores handle pesticides and/or sell gasoline or diesel fuel. Farm supply stores that handle pesticides will be affected by new pesticide regulations concerning farmworkers and groundwater. For those farm supply stores that also provide petroleum products, the underground storage tank technical standards and financial responsibility requirements will apply. Farm supply stores will also be affected by reporting requirements for toxic chemicals and by restrictions on the land disposal of hazardous wastes.

A farm supply store with fewer than ten employees, that does not handle pesticides and does not sell petroleum fuels, would have no costs associated with the major regulations. A farm supply store that handles pesticides would face increased annual costs of approximately $2,100 and would have first-year costs associated with the farmworkers regulation of approximately $9,000. These annual costs amount to approximately 5% of annual net profits. The first-year costs amount to about 2% of the average store's equity. These figures suggest that farm supply stores that do not sell petroleum should be able to meet environmental requirements without difficulty.

A farm supply store that sells petroleum fuels would have increased annual costs of approximately $4,765, plus capital costs and additional first-year costs of approximately $11,900. These annual costs amount to about 11% of annual net profits. The capital and first-year costs amount to approximately 3% of equity. Again, these figures suggest that farm supply stores should be able to meet environmental requirements without difficulty. Farm supply stores that store petroleum or chemicals in underground storage tanks, may find that their tanks are leaking, however. In this event, they would face corrective action costs. If groundwater contamination or other serious damage must be repaired, these corrective action costs could exceed $100,000, and thus could exceed the equity of the smallest farm supply stores that are in less than average financial condition.

Interstate Trucking

Environmental concerns associated with the trucking industry include potential spills and leaks from underground storage tanks (USTs) containing diesel fuel or used oil. If a trucking operation performs its own maintenance, then it uses solvents for degreasing parts. Waste disposal problems would involve used oil and spent cleaning solvents. The used oil might be put into USTs or into drums. The washing of trucks is done with chemicals and steam cleaning, creating wastewater runoff. For a tank truck, the "heel," or what is left in the tank after draining the previous haul, must be steamcleaned out and perhaps handled as a hazardous waste. Small trucking companies usually have these cleaning functions performed by outside services.

The principal environmental regulations that will affect the interstate trucking industry during the period 1988-1992 are those intended to secure the underground storage of fuel and correct any damage caused by leaks. These regulations will apply only to those firms that store petroleum fuels on their premises or store waste oils in USTs. These are generally only the larger trucking companies. The other environmental regulations that will affect the interstate trucking industry will do so indirectly, increasing the price of trucks, fuel, or waste disposal.

Because the most costly regulations will affect only the larger firms, interstate trucking companies should be able to manage the costs of the environmental regulations included in this study. The costs of approximately $3,200 per year for UST and waste-oil regulations represent about 7% of the annual profits of the smallest companies likely to be affected by the regulations. The required investment of $3,000 to upgrade each UST represents about 2% of their net worth.

Trucking companies that find that their USTs have been leaking will face much higher costs, however, possibly exceeding $100,000. EPA's experience to date indicates that 15 percent to 20 percent of the USTs may be leaking. Some of these firms with leaking USTs may be unable to afford the required corrective actions.

Gasoline Service Stations

Environmental concerns at gasoline service stations include potential spills and leaks from USTs containing gasoline, diesel fuel, and/or used oil, and vapor emissions from the handling of gasoline. Waste disposal problems at retail gasoline outlets involve used oil and spent cleaning solvents.

The principal environmental regulations that will affect gasoline service stations between 1988 and 1992 are the technical standards for USTs, and the financial responsibility requirements for the owners and operators of USTs. In addition, gasoline service stations in certain areas that are not attaining air quality standards (e.g., St. Louis) will be required to install air emission controls on the nozzles of their gasoline pump hoses. Other EPA regulations that may affect retail gasoline outlets include regulations pertaining to generators of small quantities of hazardous waste.

The major impact of the environmental regulations upon gasoline service stations will depend mostly upon the status of the stations' USTs. The cleanup of even small releases could place the average station in a poor or distressed financial condition. The cleanup of large plume releases could result in the average station's failure. Fortunately, not all firms will incur corrective actions, and some states may use state funds to aid small firms in meeting the costs of corrective action. The capital investments required by the environmental regulations can be sustained by most small firms if they are allowed several years to make the expenditures. If, however, all capital expenditures under all regulations must be met in a two- to three-year period, only the strongest firms are likely to survive.

Dry Cleaning

Most of the environmental problems in the dry cleaning industry are related to dry cleaning solvents. Over the years there has been a pronounced trend away from the use of petroleum-based solvents and toward the use of perchloroethylene (perc). Over 84% of all dry cleaning facilities use perchloroethylene. Most of the remaining facilities use a petroleum-based solvent, and a small percentage use either fluorocarbon or trichloromethane. Environmental problems are created by the evaporation of these solvents and by the presence of these solvents in wastewaters and solid wastes. Spent solvents and wastes contaminated by solvents are considered hazardous. Dry cleaners that use petroleum-based solvents generally store these solvents in underground storage tanks, with the consequent environmental risks associated with spills and leaks.

The principal environmental regulations that will affect dry cleaners during the 1988-1992 period will be those that control the evaporation of perchloroethylene from perc dry cleaning machines, restrict the handling and disposal of hazardous wastes, and require the reporting of toxic chemicals stored on premises. Dry cleaners that use petroleum solvents will not be subject to the perchloroethylene air emission standards,* but may be subject to EPA's requirements for underground storage tanks. Dry cleaners also will be affected indirectly by a series of EPA regulations that will impose stricter standards on waste disposal in general, and hazardous waste disposal in particular.

The most expensive regulations will apply to selected dry cleaners -- namely, perc dry cleaners that have no emission controls (about 50%) and petroleum dry cleaners with regulated underground storage tanks. Unfortunately, the status of these two important regulations is still uncertain.

Businesses in the dry cleaning industry are among the smallest of the small. Most dry cleaners have fewer than five employees, and average sales per employee that are less than half the national average. The median dry cleaner with 1-9 employees in 1983 had profits of less than $10,000 and equity of less than $40,000. While their rate of return on equity was high, the profit available to absorb additional costs is low. Dry cleaners at the lowest quartile of profitability in this size category in 1983 had net profits of only $5,000 and equity of only $8,000.

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* Air emission standards for petroleum solvents may be established during the 1988-92 period, but for now EPA has deferred making this decision.

Should perc emission controls be required of the smallest dry cleaners, current estimates show they may have to invest $6,000 or more for the perc controls plus an additional $4,300 for SARA and RCRA and will face additional annual costs of up to $2,800 to meet all of the regulatory requirements. These costs amount to about 35% of the median annual net profits and about 33% of the median equity of dry cleaners with 1-9 employees. Dry cleaners at the lower quartile level of this smallest size category will have to spend about 60% of their annual net profits and over 150% of their equity. These figures suggest that some of the smallest dry cleaners may have difficulty installing perc emission controls in addition to meeting the other environmental requirements. The perc regulation is still under formulation with many options under study, however, so that actual costs for perc emission controls may be much different than preliminary estimates.

Dry cleaners with regulated underground storage tanks will have to invest approximately $7,300 to upgrade their tanks* and meet the additional first-year costs and will face additional annual costs of approximately $3,700. These costs amount to about 40% and 19%, respectively, of the median annual net profits and equity of dry cleaners in the smallest size category. Dry cleaners at the lower quartile level of this size category will have to spend about 80% of their annual net profits and about 100% of their equity. These figures suggest that many of the smallest dry cleaners will have difficulty meeting UST standards. If their underground storage tanks are found to be leaking, these dry cleaners will face much larger costs to complete the required corrective actions. These costs could average over $50,000 and at times could exceed $100,000. Such costs would exceed the equity of the average dry cleaner even in the 10-19 employee size category. Many small dry cleaners will not have the resources to pay for such large corrective action costs.

Photofinishing Laboratories

There are five major chemical processing steps that are generally used in processing color film or paper: developing, stopping development, bleaching, fixing, and stabilizing. The developing solutions contain silver, a hazardous but also a valuable material. Some of the other solutions used in photofinishing processes, such as ferrocyanide bleach, are also hazardous. The silver and hazardous solutions are potential sources of environmental problems, if they are allowed to contaminate wastewaters or other wastes.

Because silver is a valuable metal, photofinishers recycle and reclaim the silver so that they generate little or no silver-containing wastes. Small photofinishers also avoid generating hazardous wastes by using nonhazardous bleaching solutions, such as iron EDTA. Finally, photofinishers that process 1,600 square feet of film or less each day are exempt from EPA's effluent limitations for wastewaters. Consequently, most small photofinishers have no substantial environmental problems and will not be affected directly by any of the environmental regulations covered in this study.

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* These costs assume that USTs containing petroleum solvents are regulated as petroleum USTs. If they are regulated, instead, as chemical USTs, dry cleaners' upgrade costs will be greater.

Water Supply

The water supply industry consists of both publicly owned and privately owned water supplies. Publicly owned water supplies are predominantly owned by local municipal governments, although a sizable number are owned by the federal government. Privately owned systems that serve large populations are usually investor-owned entities. Privately owned systems that serve smaller populations tend to be owned by real estate developers, homeowners associations, or mobile home parks.

Unlike most industries that EPA regulates, water supply companies do not discharge pollutants or produce hazardous substances. Instead, water supply companies produce a product, drinking water, that is itself considered to be an element of the environment. Consequently, EPA's regulations for water supply companies are similar to product specifications. Instead of establishing standards for the maximum discharge of pollutants, most drinking water regulations establish standards for the maximum level of contaminants permitted in the water that these systems supply to their customers.

Water supply systems are regulated under the 1974 Safe Drinking Water Act (SDWA) and the 1986 Amendments to the Act. Under the 1986 Amendments, EPA is required to promulgate National Primary Drinking Water Regulations (NPDWRs) for 83 specific contaminants. The SDWA requires that regulations for these 83 contaminants, as well as other regulations discussed below, must be adopted on a very stringent schedule -- by June 19, 1989. In addition to the tight EPA regulatory schedule, NPDWRs must officially take effect at the state level within 18 months of promulgation, assuming the state fulfills primacy requirements.

Three other provisions of the SDWA are likely to have significant impacts on the drinking water industry. EPA is required to specify conditions under which public water systems served by surface water sources are required to install filtration as a treatment technique. EPA is also required to promulgate NPDWRs for disinfection as a treatment technique for all public water systems. Further, the SDWA mandates EPA to publish regulations that require public water systems to monitor for a number of "unregulated" contaminants at least once every five years. To help small systems comply with the disinfection requirement and the "unregulated" contaminants monitoring requirement, the SDWA authorizes funds for EPA and the states to provide assistance to small systems. These funds have not been appropriated.

Although the environmental requirements for water supply systems will be expensive, compliance costs ultimately will be reflected in increased rates and borne by customers. Due to often inadequate rate bases, small systems -- particularly those that serve fewer than 2,500 people -- and their customers face the greatest difficulty in financing the necessary compliance activities.

Water supply systems will have to monitor their water for a greater number of contaminants than is currently required and install appropriate treatment equipment if contaminants exist at unsafe levels. Some small systems will most likely have a significant number of violations until adequate treatment is in place; therefore, public notification of violations will be an additional expense.

Recognizing that small systems may be limited in their ability to comply with the new regulations, EPA is attempting to minimize the economic impact on small systems where possible without reducing the protection of public health. The SDWA provides an exemption procedure that allows water supply companies additional time to meet the new standards, provided that the water being delivered in the interim does not present an unreasonable risk to health. It is expected that exemption procedures will be used primarily to assist small supplies in achieving compliance. Water supply systems serving less than 500 service connections, or approximately 1,500 people, are eligible for extendible two-year exemptions. These extendible exemptions may be granted based upon the need for "financial assistance for the necessary improvements," unless there is an unreasonable risk to health.

CONCLUSION

Although the list of EPA's 85 regulations appears to be foreboding, a closer examination reveals that seventy percent of the 3.5 million small businesses in the United States are in sectors of the economy that produce little or no pollution--wholesale and retail trade, finance, and services. Most of these businesses will not be affected directly by any of the 85 regulations. Small businesses that contribute to environmental problems will incur additional costs to comply with the regulations, however, and in some industries the costs may be high.

This study examined the effects of environmental regulations on small businesses in nine industries judged likely to experience high compliance costs. The study found that costs may be high for small businesses in three of the industries--electroplating, wood preserving, and pesticide formulating and packaging. If costs prove to be as high as estimated and cannot be passed on to consumers, some small businesses in these industries may be forced to discontinue part of their operations or to close. Some small dry cleaners that have underground storage tanks or require substantial perchloroethylene emissions controls may also have difficulty meeting environmental requirements. In addition, certain gas stations, trucking firms, and farm supply stores with leaking underground storage tanks may face corrective action costs beyond their financial means. Small private water supply companies are in a unique position, in that they operate as utilities and generally can pass costs on to their customers. While these firms would not be expected to go out of business, high environmental costs for water supply companies that fail to meet new drinking water standards may necessitate large increases in household usage fees. Environmental costs for one of the industries studied -- photofinishing laboratories-- were found to be negligible.

While some small businesses will incur additional costs because of environmental regulations, those small businesses that help to solve environmental problems will experience an increased demand for their services. Small businesses that provide analytical, engineering, or construction services, for example, might be included in this category. The potentially stimulating effects of environmental regulations have not been included in this study.

The regulations that appear to be most often responsible for high costs in the industries studied are those covering the handling and reporting of toxic chemicals; the handling, treatment, and disposal of hazardous wastes; and the operation of

underground storage tanks. Although costs estimates are available for only some of these regulations, those that are available indicate that the regulations will affect a large number of firms in many industries and may entail costs in the $5,000 to $10,000 range. Although these costs may be managed easily by small businesses of moderate size, they present difficulties for the smallest of the small businesses. It is these very small businesses that comprise the majority of U.S. businesses.

This relationship between environmental damage and pollution control expenditures is an important element that must be included in this discussion. Environmental regulations are created to reduce the risk to human health, welfare, and the environment from pollution and hazardous substances. Any discussion of the adverse impacts of these regulations must be balanced by a discussion of the benefits that are generated by these same regulations. Cleaning up sites contaminated by hazardous waste disposal or leaking underground storage tanks reduces the exposure of individuals to carcinogens, reclaims and prevents further contamination of drinking water supplies, and restores property values. Controlling the emissions of perchloroethylene from dry cleaning machines reduces both ambient and occupational exposure to a carcinogen. All of the industries studied that will experience significant adverse impacts because of environmental regulations are industries that produce substantial environmental risk. To the extent permitted by law, the regulatory process at EPA includes balancing the costs and impacts of environmental regulations with the benefits produced by reducing these environmental risks.

Chapter 4

AGRICULTURE

Environmental regulations affect U.S. farms in many ways. Traditionally, the most important of these regulations have been those that restrict, and in some cases prohibit, the use of certain pesticides. Pesticides will continue to be the subject of the most important environmental regulations for agriculture, not only of the traditional registration and use regulations, but also of new regulations requiring health and safety precautions for farmworkers using pesticides, controls on the use of pesticides in areas with vulnerable groundwater or near targeted estuaries, and restrictions on the use of pesticides that threaten endangered species. In addition, other proposed and forthcoming environmental programs affect agriculture. These include the banning of lead in the gasoline used in farm vehicles, the control of stormwater and other runoff from agricultural lands, restrictions on agricultural burning, standards for the operation and repair of underground storage tanks containing petroleum and chemicals, and the reporting of toxic chemical use.

This study* examined the cumulative impact of recent and proposed future EPA actions on the financial condition of farms in the United States. The actions included in the analysis are those that have been promulgated since 1982 or are anticipated to take place by 1992, and have a direct impact on agriculture. The primary goal of the study is not to determine the aggregate total cost of EPA actions on agriculture, but to examine the impact of these actions on the profitability and survivability of U.S. farms. Because of the complexity of the agricultural sector and the many uncertainties that still accompany the new environmental programs, this study has had to limit its focus to a few "representative" farm types and has had to make many assumptions about future environmental requirements and other factors that will affect farms, such as farm support programs under the Food Security Act. Accordingly, the study cannot be considered to cover all potential agricultural impacts or to present the final word on future environmental programs. It does, however, describe the kinds of effects that may occur and estimates the range of potential impacts upon a group of farms that are likely to experience relatively large environmental costs. The study does not address the yield and quality increases associated with environmental quality improvements.

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* The Agriculture Sector Study: Impacts of Environmental Regulations on Agriculture; prepared for the U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation by Terry Dinan of EPA, and Craig Simons and Roger Lloyd of Development Planning and Research Associates, Inc.; September 1988.

AGRICULTURE AND ENVIRONMENTAL REGULATIONS

There are a number of environmental and health hazards that may be associated with agricultural production. These include:

1. Surface Water Pollution

   Water running off farmlands may carry soil particles, fertilizers, pesticides, and animal wastes into the surface waters.

2. Groundwater Pollution

   Pesticides and sewage sludge applied to fields and crops, as well as petroleum and chemicals from leaking underground storage tanks, may seep into the groundwater.

3. Air Pollution

   Air pollution problems may result from agricultural burning practices and from the use of leaded gasoline-powered trucks, tractors, and combines. In addition, increases in tropospheric ozone can decrease crop yields.

4. Worker Exposure

   Farmworkers who handle pesticides may be exposed to the harmful effects of these chemicals.

5. Endangered Species

   Endangered species may be exposed to the harmful effects of pesticides applied to fields and crops in their habitat. Another threat is a reduction in their habitat caused by agricultural expansion.

6. Dietary Risk

   Pesticide residues may remain on agricultural products that reach the consumer.

Pesticides play a role in most of these hazard pathways and are a critical focus of the environmental regulations that affect agriculture. Every pesticide must be registered with EPA's Office of Pesticide Programs (OPP). OPP reviews the health, safety, and environmental effects of these pesticides and, from time to time, issues regulations that restrict or prohibit the use of certain pesticides that are judged to present an unreasonable adverse effect. As mentioned above, EPA also issues regulations controlling the runoff of waters from agricultural lands, the operation and repair of underground storage tanks, and many other agricultural activities that may present environmental hazards.

These regulations affect both large and small farms in the United States. Restrictions on the use of certain pesticides may require the substitution of more expensive pesticides and/or may reduce crop yields. Other environmental regulations may impose extra operating costs or may require additional investments in land preparation or farm equipment.

The ability of farms to comply with these environmental regulations will depend not only on the costs of each regulation and the effects of the required activities on agricultural yields, but also on the financial condition of each farm, the market conditions at the time the regulations become effective, and the number of farms that are covered. While some environmental regulations apply to all farms, most apply to only a portion of all farms, such as those that use a certain pesticide or have underground storage tanks.

Although the average net farm income in 1984 was identical to that in 1971--$12,000 in constant 1986 dollars -- the financial condition of U.S. farms has fluctuated dramatically over the past two decades. Higher prices, expanding exports, and low real interest rates combined in the early 1970s to produce not only record farm incomes ($25,300 average in 1973), but also a rapid expansion in agricultural production. Unfortunately, these trends all reversed in the early 1980s. Prices declined, exports decreased, and real interest rates rose at an unprecedented rate. Average net farm income fell to a low of $10,200 in 1981 and did not surpass the $12,000 level until 1985. Declining incomes led to declining farmland values and increasing debt-asset ratios. Recently, this trend has begun to change. Decreased production expenses, increased government payments, and lower interest rates have allowed net incomes to rise to an average of $14,000 and have slowed the decline in farmland values. The average debt-asset level in 1987 is expected to show a decline from 1986.

Trends for the average farm may belie significant differences within farm size categories and types. During the 1982-1985 period, farms producing vegetables, melons, and other specialty crops enjoyed average incomes of $60,000 per year. These farms, however, account for only a small portion of all farms. Farms producing cash grain, tobacco, cattle-sheep-and-hogs, general livestock, and animal specialties all had average incomes of less than $10,000 per year. These farms account for 70% of all farms and nearly 50% of farm marketings.

The financial condition of a farm, and hence its ability to comply with environmental regulations, may vary dramatically, even within size categories and types of farms. For example, a study of the financial characteristics of U.S. farms in 1985-1986 showed 55% of all commercial farms were in a favorable financial situation, while 39% were in a marginal situation, and 3% were financially vulnerable.

STUDY METHODOLOGY AND LIMITATIONS

Study Methodology

This study consists of an in-depth examination of the cumulative impact of environmental regulations on selected livestock, major field crop, and specialty crop producers. The approach of examining only a limited set of producers was chosen because the primary goal of determining the cumulative impact of EPA actions on the

financial condition of producers requires an extensive amount of data collection and analysis. The approach followed in this study is summarized as follows:

1. Select a subset of livestock, major field crop, and specialty crop production to study.

2. Define alternative scenarios of EPA policies.

3. Estimate price changes resulting from EPA actions (under each scenario) for each of the selected crops and livestock.

4. Examine the change in the financial condition of "representative" producers of each of the selected crops and livestock under each scenario.

Crop and Livestock Selection

A crucial step was determining which farms to study. An effort was made to include those farms that were likely to experience relatively large impacts under the alternative EPA policy scenarios considered. The cases examined, therefore, provide a variety of impact levels, but include worst-case examples. For livestock and major field crops, three specific farm types were examined:

* an Illinois corn soybean farm,
* a Mississippi cotton soybean farm, and
* a Kansas cattle wheat farm.

Through discussions with staff at EPA's Office of Pesticide Programs, the following set of specialty crops was selected:

* apples,
* tomatoes,
* potatoes,
* peas,
* caneberries (e.g., raspberries, blackberries, etc.),
* peanuts.

There proved to be insufficient information to complete the analysis for caneberries and peanuts, however, so that results are available only for apples, tomatoes, peas, and potatoes. The difficulty in obtaining information about producers of specialty crops was itself a significant finding of the study.

Definition of Policy Scenarios

Because it is difficult to predict future EPA decisions for many regulations, the study examined three alternative scenarios corresponding to a range of potential policies. The scenarios can be summarized as follows:

SCENARIO 1: (conservative)	Past and current EPA actions, plus a conservative (low-cost) set of assumptions about future actions.

SCENARIO 2: (intermediate)	Past and current EPA actions, plus an intermediate (mid-cost) set of assumptions about future actions.
SCENARIO 3: (expansive)	Past and current EPA actions, plus an expansive (high-cost) set of assumptions about future actions.

Actions that EPA has taken in the past five years or plans to take in the very near future were included in all three scenarios. These include the cancellation of toxaphene, dinoseb, and chlorodimeform used for yield enhancement; restrictions on the use of alachlor; farmworker protection standards; regulations under Title III of the Superfund Amendments and Reauthorization Act; and leaking underground storage tank regulations. In addition, the three scenarios include alternative assumptions about EPA actions in the following areas: fungicides, corn rootworm insecticides, broad spectrum organophosphates, grain fumigants, pesticides in groundwater strategy, and lead in gasoline restrictions. In general, the higher-cost scenarios include more pesticide restrictions and cancellations than the lower-cost scenarios. Scenario 3 includes the elimination of lead from gasoline for agricultural use, while scenarios 1 and 2 do not.

Because several of the environmental regulations studied will not affect all of the farms in any category equally, the study examined two variations for each scenario:

* Average Impact Case: This case assumes that the producer experiences the average impact of producers of that type - e.g., if 10 percent of Illinois corn producers would experience a cost of $1,000, the average affected producer would experience a $100 cost ($1,000 x 0.1).

* Maximum Impact Case: This case assumes that the producer must meet all of the requirements of every regulation that may possibly affect producers of that type.

Estimation of Price Changes

The next step in the analysis was to translate the effects of the regulatory scenarios on crop production costs and yields into commodity price changes. In general, when production costs increase due to the costs of meeting environmental regulations and yields decline due to restrictions on pesticide use, commodity prices will rise. Failure to account for these price increases would result in overestimating the impacts of EPA actions on producers that are directly affected by those actions and would overlook the potential gain to those producers who are not directly affected by the regulations.

To predict the price changes on livestock and major field crop producers, the study used a regional econometric-simulation model, AGSIM. A much more limited price-quantity model was used to predict price changes for specialty crops. The specialty crop model does not account for variations in impacts among different regions or for the impact that EPA actions might have on substitute crops.

Impacts on Producers' Financial Conditions

Because the information available on producers of major field crops and livestock was more extensive than that available for producers of specialty crops, the study used different methodologies to estimate the impacts of environmental regulations on producers' financial conditions. The study of the impacts on specialty crop producers was necessarily much more limited than that for the major field crop and livestock producers.

To examine the impact of EPA policies on producers of major field crops and livestock, the study used a whole farm financial simulation model of representative producers, REPFARM, developed for each of the selected producers by the U.S. Department of Agriculture. Producers' financial conditions were simulated for the 1987-1996 period under a base case (assuming no EPA actions over the next ten years) and under each of the policy scenarios and impact cases described above. (Note that although EPA actions occurring over the period 1982-1992 were included in this study, the forecast period of 1987-1996 was chosen to illustrate both the effect that past actions have on producers' income and how the effect of actions that are taken change over time.) For each type of producer, the study simulated the impacts on farms in two different financial situations: (1) farms in the average financial condition of all farms of the type/region considered --e.g., the average of all Illinois corn soybean farms, and (2) farms in the average financial condition of all "vulnerable" farms of the type/region considered. Vulnerable farms were defined as farms with a debt to asset ratio of greater than 0.4 and a negative net cash income. The impact of EPA policies on these producers' income and their ability to survive was determined by examining changes in net cash farm income* and debt to asset ratios. It was assumed that a producer would go out of business whenever its debt to asset ratio reached one -- i.e., its level of debt became equal to its assets.

The impact of EPA actions on specialty crop producers was estimated by examining the change in net returns per acre for producers in different production regions. Net returns per acre, as used in this study, are equal to farm income minus all farm expenses on a per acre basis, with the exception of land and non-hired labor. Net returns per acre, therefore, is a measure of the returns to land and farmer-supplied labor. Budget information was collected for each of the selected specialty crop producers in several different production regions to establish a baseline level of net returns. The specialty crop budgets for each region were then projected over the 1987-1996 period, using the average and maximum impacts for each region under each policy scenario, along with the scenario-specific prices (determined by the national price-quantity model).

Study Limitations

As explained above, the complexity of the agricultural sector, the uncertainty associated with many environmental regulations, and the lack of information on the financial conditions of producers of some crops resulted in the study's being limited to representative farm types and having to rely on many simplifying assumptions. Each of the study's major limitations is discussed in more detail below.

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* Net cash farm income is defined as cash farm income minus cash farm expenses. It does not include depreciation of machinery or off-farm income.

Examination of a Limited Number of Commodities

Producers of crops not considered in this report will experience levels of impacts that are different from those reported. An effort was made, however, to include in this study farms that are expected to experience relatively large impacts.

Limited Information About Producers' Financial Conditions

The initial financial condition of a farm is a crucial factor in determining the effect that EPA actions will have on the farm's financial health. For livestock and major field crop producers, the study examined two alternative financial positions. Only limited information was available, however, on the financial conditions of specialty crop producers. This made it difficult to determine whether the EPA actions assumed in the alternative scenarios would actually cause any specialty crop producers to go out of business.

Uncertainty About Environmental Regulations

As discussed previously, this study does not presume to accurately predict future EPA actions. Rather, it attempts to define a range of impacts that correspond to plausible alternative policy scenarios. In addition, this study does not account for possible indirect impacts on agricultural producers (through regulation of agricultural input industries), nor does it account for actions taken at the state level.

Uncertainty About the Incidence and Magnitude of Impacts

Predicting which producers will be required to comply with which environmental regulations requires an extensive amount of information. For example, if a particular pesticide is to be canceled, detailed usage data are required to predict which producers will be affected. Pesticide usage data based on statistically valid samples for major field crops are available at state and multi-state production region levels. However, data that are not based on statistically valid samples had to be used for the county-level usage estimates necessary to model the effects of pesticides in groundwater.

Predicting the incidence of EPA actions on specialty crops was especially difficult, because there is less information about pesticide usage on these crops than for major field crops. Much of the specialty crop data used in this analysis were derived from private agencies that do not provide information on the sampling techniques used. This lack of reliable information most be kept in mind when viewing the results for specialty crops.

In addition to knowing what types of producers are likely to be affected by each EPA action, it is important to determine the extent of the impact. For a pesticide cancellation, this requires knowing what alternative will be used in place of the cancelled pesticide and what cost and/or yield variations the user will experience with this alternative. These efficacy data are not always readily available. This increases the uncertainty associated with predicting the yield effects of EPA actions. Furthermore, there was not sufficient information to fully account for changes in quality (e.g., size, shape) brought about by restrictions in pesticides.

Finally, impacts of pesticide cancellations are projected to dissipate evenly over a seven-year period, as users adjust their practices and as new pest control products become available. The use of an arbitrary assumption of this type was necessitated by the lack of a reliable method for predicting the development of substitute pest control products and the adjustment of agricultural practices over time. Clearly, this assumption may overestimate the adjustment process for some cancellations and underestimate it for others. Some commodities, such as apples and oranges, are less able to adjust to pesticide cancellations through the use of more pest resistant species due to the long term structural adjustment problems associated with tree removal and replacement.

Model Assumptions

In addition to assumptions about the incidence and magnitude of impacts, the models themselves use assumptions that affect the results. For example, the assumptions about how producers respond to changes in production costs and how consumers respond to changes in food prices are crucial in determining the extent to which EPA impacts are passed on to consumers in the form of higher prices. For livestock and major field crops, numerous assumptions about future prices, government policies, interest rates, and cost and yield trends affect the baseline projections of net cash farm income and debt to asset ratios obtained from the REPFARM models. If these assumptions result in an overestimate of the financial strength of the representative farms in the baseline, then we will overestimate the ability of producers to survive in the face of EPA actions. Likewise, if these assumptions result in an underestimate of the financial strength of the farms, then we will underestimate the ability of producers to bear the costs of EPA actions.

IMPACTS ON LIVESTOCK AND MAJOR FIELD CROPS

This study examined the impact of EPA actions on an Illinois corn soybean farm, a Mississippi cotton soybean farm, and a Kansas wheat cattle farm. The modeling of three regulatory scenarios, two regulatory impact cases, and two financial conditions for each of these representative farms resulted in 18 sets of output for each farm type. This summary presents the results first for farms in average financial condition experiencing average environmental impacts, then for farms experiencing maximum environmental impacts, and finally for farms in a vulnerable financial condition experiencing average environmental impacts. Only the results of Scenarios 1 and 3 (the conservative and expansive regulatory scenarios) are presented, illustrating a range of financial effects predicted based on the full range of policy scenarios considered in this study.

Farms in Average Financial Condition

Tables 4-1 and 4-2 present the results of the modeling effort for farms in an average financial condition and expected to experience the average environmental costs and yield reductions for their farm type. Table 4-1 presents the estimated changes in net cash farm income (NCFI) and Table 4-2 presents the estimated percentage changes in debt to asset ratios (D/A) for farms.

As can be seen from these tables, the estimated impacts of environmental regulations vary depending on the type of farm, but in general are small for the average impact cases. Under Scenario 1, the average impacted farms experience mean annual decreases in net cash farm income (NCFI) ranging from less than 1% for the Illinois corn soybean farm to 3% for the Mississippi cotton soybean farm and Kansas wheat cattle farm.

A reduction in farm income due to EPA policies may result in increases in farmers' debt to asset ratios in two ways: (1) it decreases the return to land and, therefore, the value of land (which is the primary component of farm assets), and (2) it may cause farmers to borrow funds if they are put into a position of negative cash flow. As shown in Table 4-2, none of the changes in income brought about by EPA actions under the average impact case are large enough to result in significant changes in the representative farms' debt to asset ratios. In all of the average impact cases, the change in the debt to asset ratio is less than 1%.

Under Scenario 3 (the expansive regulatory scenario) for the average impact case, the cash income of the Mississippi cotton soybean farm decreases less than under Scenario 1, and for the Illinois corn soybean farm and the Kansas wheat cattle farm, the net cash farm incomes actually increase. This occurs because the larger cost and yield changes incurred by the affected farms result in reduced production levels overall and lead to higher prices. These higher prices more than offset the average cost and yield impacts experienced by farms. Higher prices come about, however, due to decreases in the production of the commodities of interest.

Although the average impact cases result in minor losses or even increases in NCFI, farms that experience the maximum environmental costs and yield reductions would be adversely affected. In the maximum impact cases, the study assumed that the farms would experience the cost increases and yield decreases associated with each environmental regulation that could possibly affect producers of their type. The maximum impact cases include, for example, costs for the underground storage tank regulations. The potential costs associated with this regulation are substantial, yet only a small percentage of farmers are affected.* The maximum impact cases also include the yield decreases associated with pesticide cancellations, such as dinoseb and toxaphene for Mississippi cotton soybean farms. While few farms will experience the impacts of all regulations, the study examined these cases to put an upper bound on environmental costs and impacts.

Under the maximum impact case of Scenario 1, farms in average financial condition experience mean annual decreases in net cash farm income ranging from 8% for the Illinois corn soybean farm to 18% for the Mississippi cotton soybean farm to 24% for the Kansas wheat cattle farm. Under Scenario 3, these figures are even larger: 26%, 24%, and 84% respectively. The average increases (1987-1996) in debt to asset ratios are also several times larger in the maximum impact cases than in the average impact cases. Under Scenario 3, the increases range from 2% for the Illinois corn soybean farm to 6% for the Mississippi cotton soybean farm to 22% for the

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* Farmers having a petroleum underground storage tank (>1,100 gallons) were assumed to incur a $2,500/yr. insurance cost (1988-1996) and a $500 charge in 1991 and 1994 for a tank tightness test. No costs were included for remedial action, and it was not assumed that any farmers would remove their USTs.

Table 4-1

MAJOR FIELD CROP AND LIVESTOCK FARMS
AVERAGE CHANGE IN NET CASH FARM INCOME (NCFI) (1987-1996)
($1986)

Average Impact Case

Type of Farm	Average NCFI w/o Regulations	Estimated Change in NCFI Scenario 1	Scenario 3
IL Corn Soybean	$ 35,400	$ -270 (-.7%)	$ +4,800 (+14%)
MS Cotton Soybean	$ 58,900	$ -1,720 (-3%)	$ -1,300 (-2%)
KS Wheat Cattle	$ 11,600	$ -380 (-3%)	$ +310 (+3%)

Table 4-2

MAJOR FIELD CROP AND LIVESTOCK FARMS
AVERAGE CHANGE IN DEBT/ASSETS (D/A) RATIOS (1987-1996)*

Average Impact Case

Type of Farm	Average D/A Ratios w/o Regulations	Estimated Change in D/A Scenario 1	Scenario 3
IL Corn Soybean	.26	<.1%	.3%
MS Cotton Soybean	.28	.6%	.5%
KS Wheat Cattle	.26	.3%	.6%

* Note that increases in the debt to asset ratio appear as a positive percentage change in this table, but represent a worsening of a farm's financial condition.

Kansas wheat cattle farm. Even in the maximum impact cases, however, none of the farms in average financial condition were predicted to go out of business under any of the regulatory scenarios.

Sensitivity analysis reveals that assumptions about crop yields and future crop prices have a large effect on these results. For example, upper and lower sensitivity runs were made assuming that prices were 15% higher and lower respectively in the years 1991-1996. The resultant NCFIs in the upper sensitivity runs were double those in the lower sensitivity runs. This analysis illustrates the sensitivity of the results of this study to critical assumptions, and helps to place the magnitude of the predicted effects in perspective relative to the other factors that influence farms' financial health.

Farms in Vulnerable Financial Condition

The initial financial condition of farms is an important factor in determining the impact of EPA actions. Farms in vulnerable financial condition are characterized by high debt to asset ratios and negative net cash income. Further losses caused by EPA actions may force these farms to borrow additional money and, therefore, worsen their debt to asset ratios. In addition, these losses lower the value of their primary asset, their land. The REPFARM model assumes that farms go out of business when the debt to asset ratios reach one.

The percentage of each of the three farm types that are classified as vulnerable is indicated in Table 4-3. The Kansas wheat cattle farm in vulnerable financial condition was predicted to go out of business in 1993 in the base run of the REPFARM model, even without the added burden of environmental regulations. This farm is predicted to go out of business one year earlier due to the income losses caused by environmental regulations under the maximum impact case for Scenario 1. Under all other sets of assumptions, the Kansas wheat cattle farm does not go out of business any earlier due to environmental regulations. The vulnerable Illinois corn soybean farm and the vulnerable Mississippi cotton soybean farm were not predicted go out of business in the REPFARM runs under any of the scenarios with or without environmental regulations.

Table 4-3

FARMS CLASSIFIED AS VULNERABLE

Farm Type	Total Number of Farms	Percent Vulnerable
Illinois Corn Soybean	30,837	10%
Mississippi Cotton Soybean	1,798	14%
Kansas Wheat Cattle	19,966	7%

Although environmental regulations are not expected to generate larger income losses for farms in vulnerable financial condition than for those who are in better condition, vulnerable farms are more sensitive to income changes and are more likely to feel the results of EPA actions on their financial standing. For example, under the maximum impact case for Scenario 3, both the Illinois corn soybean farm in average financial condition and that in vulnerable financial condition experience a

decrease in NCFI of approximately $9,000. The 1987-1996 average debt to asset ratio of the farm in average financial condition increases only 2% due to this loss, however, while the debt to asset ratio of the vulnerable farm increases 24%.

IMPACTS ON SPECIALTY CROPS

The study included complete analyses of four specialty crops: apples, potatoes, tomatoes, and green peas. Because less information was available for specialty crop farms than for the major crop and livestock farms, the impacts were measured in terms of the net returns per acre, rather than changes in net cash farm income or debt to asset ratios. Net returns per acre measure the returns to both land and farmer-provided labor. Furthermore, the analysis was not able to distinguish between farms in average financial condition and farms in vulnerable financial condition. The analysis was carried out for the same three regulatory scenarios used for the major crop and livestock farms, and for both the average and maximum impact cases. Because the economics of specialty crop farming vary by region, the analysis was carried out for each of the major regions growing the specialty crops studied.

The original study plan included caneberries and peanuts. However, major data problems prevented this part of the analysis. For caneberries, the primary limitation was the lack of information regarding pesticide use and the efficacy of pesticide alternatives. The analysis of peanuts was prevented by unreliable cost and yield estimates associated with various environmental regulations and the lack of critical crop production parameters (e.g., supply elasticities). Lack of accurate usage data, efficacy data, and crop production parameters are problems that are commonly encountered when trying to examine the effects of environmental regulations on specialty crops.

Average Impact Cases

The results of the analysis for specialty crop farms experiencing average cost and yield impacts are presented in Table 4-4. The changes in net returns per acre under Scenario 1 are less than one percent for most regions and less than six percent for all crops and all regions. The changes in net returns per acre under Scenario 3 are much greater, particularly for apple farms in New York and Michigan. Regional differences in impacts are apparent especially under Scenario 3.

Apple producers in all three study regions (Washington, New York, Michigan) experience similar decreases in net returns per acre under Scenario 1 -- from $2.40 to $3.58 per acre -- but these decreases are higher on a percentage basis in Michigan, because of the state's lower average returns per acre. The large impacts under Scenario 3 and the substantial difference among regions is due to proposed restrictions on the use of fungicides in 1990. These restrictions would substantially affect New York and Michigan apple production (e.g., 17% and 12% yield reductions, respectively, in the average impact case) but have no effect on production Washington.* The slight rise in Washington producers' net returns is due to the increase in price above the base year caused by the national decline in apple supply.

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* The fungicide restrictions considered under Scenario 3 are the cancellation of all EBDCs and chlorothalonil.

Table 4-4

SPECIALTY CROP FARMS
AVERAGE CHANGE IN NET RETURNS PER ACRE (NR/A) (1987-1996
(\$1986)

Average Impact Case

Type of Farm/Region	Average NR/A* w/o Regulations	Estimated Change in NR/A Scenario 1	Scenario 3
Apples			
WA	\$ 330	-0.7%	+ .2%
NY	\$ 220	-2%	-60%
MI	\$ 80	-4%	-84%
Tomatoes			
CA	\$ 660	-0.2%	-1%
FL	\$1,500	<0.1%	-14%
Potatoes			
WA/ID	\$ 600	<0.1%	+3%
MN/ND	\$ 240	-0.8%	-5%
ME	\$ 130	-0.8%	-10%
Peas			
WI	\$ 200	-0.6%	<0.1%
WA	\$ 80	-4%	-4%

* Net returns per acre without the added environmental regulations are based on regional budget information and are assumed constant over the period 1987-1996. Net returns per acre reflect returns to land and farmer-provided labor.

These price increases offset any initial yield losses and production cost increases that the Washington apple growers incur under the average impact case. The decreases in net returns for Michigan and New York apple farms under Scenario 3 are dramatic (84% and 60%,respectively) and may bring about substantial structural changes. The discussion of these possibilities is beyond the scope of this study, however.

Decreases in net returns per acre are very small (.2% or less) for both Florida and California tomato producers under Scenario 1. Losses increase substantially for Florida producers under Scenario 3, because of estimated yield losses of 20% due to fungicide restrictions. Because 98% of Florida tomato farms would be affected by these restrictions, as opposed to only 25% of California tomato farms, the losses in the average impact case are greater under this scenario in Florida than in California. The impact estimates for tomatoes under Scenario 3 must be viewed with some caution, however. Yield declines and cost increases were based on information provided by pesticide registrants and have not been thoroughly reviewed by EPA.

The changes in net returns per acre for potato farms under Scenario 1 are less than 1% for all regions. Under Scenario 3, however, the impacts are dominated by the 1990 proposed restrictions on organophosphate use. These restrictions result in 8% reductions in yield on affected acreage, as well as increases in production costs. The magnitude of the impacts in Scenario 3 are projected to result in potato price increases. In Washington-Idaho this increase in price should offset the decline in yield so that net returns actually increase. In the other regions, the net returns per acre are estimated to decrease from 5% to 10%.

The impacts on green pea farms are relatively small under both regulatory scenarios, with the farms in Washington experiencing about a 4% decrease in net returns, as compared with a negligible change in Wisconsin.

Maximum Impact Cases

Under the maximum impact case, net returns per acre decrease substantially more than under the average impact case for many crops and regions. There are no dramatic shifts in relative impacts among crops, however, and the conclusions stated above for the average impact case remain generally the same. As with the major field crop and livestock farms, it is important to note that the maximum impact cases represent very unlikely worst cases.

For apple farms, the maximum impact case approximately doubles the decrease in net returns per acre under Scenario 1 for all regions. In Michigan, for example, the decrease is approximately 7%, as compared with 4% in the average impact case. Under Scenario 3, net returns decrease by approximately 74% in New York and over 182% in Michigan (losses of greater than 100% indicate that net returns are negative). As mentioned above, these dramatic reductions in net returns per acre could have a significant effect upon the industry.

The maximum impact case for tomato farms reduces the large differential between impacts in California and Florida under the strictest regulatory assumptions. Under Scenario 1, the estimated decreases in net returns per acre are greater in the maximum impact case than in the average impact case, but remain under 1%. Under Scenario 3, however, the estimated decrease for Florida remains at about the same

level as under the average impact case (16% vs. 14%), but the impact for California increases from about 1% to about 20%. As mentioned above, these impact estimates for tomatoes under Scenario 3 were based on information that has not been thoroughly reviewed by EPA, however, and must be regarded as tentative.

For potato farms, the largest percentage change in the maximum impact case under Scenario 1 occurs in Maine, where net returns per acre decrease by nearly 8%, as compared with a decrease of less than 1% in the average impact case. The maximum impact estimates are considerably larger than the average impact estimates because of such regulations as the EDB cancellation in 1984, the dinoseb cancellation in 1987, and the groundwater regulations in 1990. While the combined cost and yield effects of these regulations are significant, only a small percentage of producers are likely to be affected by all of these regulations. Under Scenario 3, the estimated decreases in net returns per acre range from 8% in Washington-Idaho to 20% and 22% in Maine and Minnesota-North Dakota, respectively.

The maximum impact case for green pea farms results in no dramatic changes. Estimated decreases in net returns per acre remain under 1% for Wisconsin farms and increase from about 4% to about 6% for Washington farms under both Scenarios.

CONCLUSION

This study examined the impacts of recent and proposed environmental regulations on three different types of livestock and major field crop farms in both average and vulnerable financial situations under a variety of regulatory scenarios. For the three types of farms studied, the financial model predicted no closings of the representative farms in average financial condition under any of the regulatory scenarios. The representative Kansas wheat cattle farm in vulnerable financial condition was predicted to go out of business, even in the absence of environmental regulations. The representative Illinois corn soybean farm and Mississippi cotton soybean farm in vulnerable financial condition were not predicted to go out of business, however, even under the most costly regulatory scenarios. Out of the six representative farms examined, none of the regulatory scenarios led to the closing of farms that would not have closed otherwise.

For two of the three types of major field crop and livestock farms studied, the financial condition of the farms that experience the average cost and yield impacts actually improved under the more stringent regulatory scenario. This occurs because the larger cost and yield changes incurred by affected farmers reduce production levels and raise commodity prices. These higher prices more than offset the cost and yield impacts experienced by the average impacted farmer.

Farms that would have to bear the maximum environmental costs and yield changes were found to experience reductions in net cash income many times that experienced by the average farms. Although none of the regulatory scenarios was found to result in the closings of even these maximally affected farms that were in an average financial condition, their average debt to asset ratios were found to deteriorate by up to 23%. Maximally affected farms were those that were assumed to incur all of the cost and yield impacts that were possible for that type of farm. It must be emphasized that the maximum impact scenarios included in this study represent extremely unlikely worst-case events.

Because of limited data availability, the study did not forecast changes in the financial condition of the specialty crop farms. Instead, it examined changes in net returns per acre (which reflect returns to land and farmer provided labor). Under the least costly regulatory scenario, the changes were generally less than 1% for the average farm and less than 8% for even the maximally affected farm. Under the most costly regulatory scenario, however, losses of the average impacted producers increased substantially, particularly for apple producers in New York and Michigan, where predicted losses were 60% and 84%, respectively. These dramatic decreases in net returns may bring about substantial structural changes in the production and markets for the crops affected. Large differences in the impact of EPA regulations on crops grown in different regions occurred because some of the proposed restrictions involve pesticides that are used in some regions and not in others. Even though the results of this study must be considered preliminary, these figures show that EPA actions could create economic problems for some specialty crop farms and suggest that the Agency exercise considerable caution in this area.

Limitations in the necessary data and models must be considered when viewing the results presented in this study. These limitations are most severe for specialty crops, where reliable pesticide usage data often do not exist, and few models are available to predict commodity crop price impacts and farm-level financial effects. Reliable pesticide usage data, efficacy data, national price-quantity models, and farm-level models are important in order to mitigate the potential environmental and health hazards associated with agriculture in a cost effective way. Such needs are likely to become increasingly important in the future, as EPA tries to deal with environmental concerns (such as pesticide damage to endangered species and pesticide contamination of groundwater) that may necessitate very localized restrictions in pesticide use.

Chapter 5

POLICY CONSIDERATIONS

The three sector studies summarized in this report have taken a first look at the potential effects of recent and forthcoming environmental regulations on municipalities, small business, and agriculture. Although these studies must be considered as preliminary efforts to shed some light on very complex questions, they have proved useful in describing the kinds of effects that are possible and in suggesting areas of potential policy initiatives and/or of further study.

In response to the findings of these sector studies, several areas for potential policy initiatives have been suggested. While none has been endorsed by the Sector Study Steering Committee, they are presented below to illustrate the kinds of activities that might be considered and to promote further discussion.

MUNICIPALITIES

Two of the findings of the municipal sector study are that there will be significant increases in household payments for improved environmental services as a percentage of household income in the coming decade, and that many small and some large communities may have difficulty raising the capital needed for investments in new environmental infrastructure. The burden is most severe for small communities because of their lower income levels and higher costs for environmental services. The financial difficulties are partly due to the timing of the needs -- a large new set of investments in a fairly short time period -- and partly due to constraints placed on new revenue potential by existing demands on municipal services.

A number of activities have been implemented by EPA and other initiatives have been suggested to support these small communities' compliance with environmental regulations. These include establishing public dialogues on the issues, and extending technical and financial assistance programs, as well as several others. The study also points to several areas where information from additional research would help identify which activities supported by EPA and states would be most effective in assisting communities as they seek to comply with environmental requirements.

Public Education Initiatives

Public education has two purposes. First, making people aware of the potential net benefits to be gained by investing in environmental protection should provide a better forum for assessing the merits of the project. Second, where the

environmental benefits are diffuse and it is difficult to assign benefits to specific groups of payers (e.g., long-distance air pollution), moral suasion may improve compliance as people become aware of the larger cooperative undertaking that is being proposed. Public notification requirements, and efforts to better communicate information on pollution risks, are but a few of the methods at the disposal of federal, state and local governments to include the public in establishing environmental programs and setting priorities.

Technical Assistance Initiatives

Operations Assistance

In many cases, small communities do not need full-time personnel in all specialties or service areas. Provision (for a fee) of such services by a central authority, either the federal government or state governments, could allow small communities to gain from economies of scale and scope.

Such technical assistance programs could take the form of either guidance--such as sharing scientific, technical, or management information -- or technical services -- such as supplying laboratory or engineering services. In addition, educational institutions (technical and academic) can continue to play an important role in working with local communities in need of their particular levels of expertise.

Public Partnerships

Partnerships provide an informal mechanism for communities to share expertise, to purchase services and goods in larger volumes for discounts, and, more formally, to raise capital in larger more cost-effective blocks. Partnerships between unequal entities could be encouraged by providing incentives to the larger (wealthier) partner. Potential partners include large cities and small cities, well-to-do cities and poor cities, and urban cities and rural cities.

Regionalization

Regionalization is a more structured form of partnership, in which two or more communities create a joint venture for a particular purpose, such as construction of a water supply system. This action allows a variety of efficiency gains, including economies of scale and scope, and large-volume purchase discounts. The use of regionalized services may be more suitable for some environmental services, but not necessarily for all services. For example, in those instances where regionalization may lead to a waste disposal service collecting and concentrating pollution risks, the merits of this approach versus de-centralized treatment and disposal operations must be examined.

Financial Initiatives

Reform of Existing Rate Structures

In cases where the basic management structure is in place, rate reform may be necessary to insure the financial viability of the environmental service. Rate reform may include raising the level of rates (increasing revenue) or changing the rate structure (e.g., instituting marginal cost pricing, including peak load pricing when

appropriate). Communities can examine current rate structures to insure that rates are generating revenues equal to the full cost of services. Current provisions for obtaining federal grants include this element, and efforts are underway to evaluate whether communities have been establishing suitable rate structures.

Development Taxes

Special taxes may be levied in areas undergoing rapid growth and development. These assessments could be earmarked for the improvement of environmental services and could be levied on developers directly or on property owners who expect to profit from development. Since environmental improvements often affect property values, a similar approach might be used even in relatively low-growth areas. Many specific versions of development taxes have been devised. A few of the more common are:

- ad valorem on property;
- exactions from developers (in kind or cash); and
- tax incremental financing (tax rates are not changed, but as property values rise, property tax revenues above a baseline are devoted to special uses, such as sewage system construction or road building).

Special Revenue Districts

Certain geographic areas, within one political jurisdiction or including several jurisdictions, are created for the purpose of raising revenue from residents in the area to be used for specified purposes. Examples include road districts, sewer and water districts, or other types of local service districts.

Enterprise Fund Management

Utilities or enterprise fund management systems are used to ensure that revenues raised from certain groups of payers are used for the intended purpose and are managed according to sound financial principles. Organizations of these types can help to balance costs and revenues by improving financial management and, therefore, can improve access to capital markets.

Direct Financial Assistance

Direct financial assistance may be appropriate for low-income communities where it is agreed that the environmental protection services should be made available to all citizens, regardless of ability to pay. It may be appropriate to provide assistance only to those communities that fail an "income" or other "ability to pay" test. Such assistance could be from the state governments, which would need to consider adopting appropriate tests for directing financial assistance, and utilizing them in a consistent manner across the agency. Direct financial assistance could be in the form of either grants for communities that cannot afford the services in the long run or loans for communities that are experiencing a short-term cash-flow problem.

Other Actions

Compliance Schedules

If certain environmental regulations do not seem reasonable for a specific group of people, or if the timing of the compliance schedule is not reasonable, then a delay of the regulation or a permanent exemption may be appropriate. Such actions should only be allowed subject to certain constraints, such as that no "unreasonable risk to health" would be created. In all instances, the ability to grant exemptions is dictated by existing legislation. Several existing laws allow for exemptions, but the rules are not consistent, and do not dictate what measures should be considered when allowing for an exemption. The EPA does not have an internally consistent method for determining when the costs of a requirement are unaffordable, either to the household, or for purposes of evaluating impacts on municipal finances. Neither does EPA have criteria for evaluating the cumulative economic impacts of its programs. Efforts are underway within EPA to resolve existing inconsistencies, and establish a protocol for granting exemptions where allowed for by law.

Privatization

Communities can explore methods of working with private companies to assist in the provision of environmental services. Several aspects of privatization include:

- Private sector ownership, construction and/or operation of facilities (reduce cost of services by taking advantage of economic and/or administrative efficiencies),

- Private financing of new capital formation, or refinancing existing financial obligations (reduce financial obligations of community).

Private companies have been involved in the provision of several environmental activities, particularly solid waste and drinking water services, and a growing number of companies are expressing interests in wastewater treatment services.

Despite the potential advantages of public/private partnerships, the current supply of private firms is relatively small. Private involvement in many environmental services can be affected by federal and state tax requirements, several of which have undergone significant revisions in recent years. Some of the revisions have reduced the tax advantages of public/private ownership. In addition, decisions to use private companies require considerable effort in establishing contractual arrangements and liability responsibilities in cases of damages or permit violations. EPA is currently investigating this issue in greater depth, and plans to hold several conferences with experts in the field and interested parties in the coming months.

Additional Research

An important finding of the municipal sector study is that not all communities are expected to face financial difficulties. This fact suggests that further analysis should be conducted in order to identify the characteristics of small and large communities that make them more likely to experience difficulty in financing and affording new environmental protection. For example, does a problem typically arise in communities that are:

- very small or sparsely populated (lack economies of scale and scope),
- poorly managed (have poor access to financial markets),
- low income (are unable to afford environmental protection),
- rural (have poor access to technical services), or
- uninformed (lack understanding of the importance of environmental protection),
- facing significant environmental burdens (are currently investing an above average amount of resources to combat existing pollution problems),
- located in a particular state (are some states more aggressive in assisting their financially constrained communities)?

If EPA can better identify those characteristics of communities that most inhibit compliance with environmental regulations, then it can improve upon its current efforts to design and implement programs that are targeted at the sources of the problem.

SMALL BUSINESS

The small business sector study has provided a number of insights into the potential impacts of EPA's regulations on small businesses. While EPA's primary mission is to reduce the risks posed by environmental damage, the Agency also seeks to minimize the unnecessary adverse social and economic impacts of its regulations whenever appropriate. In this context, the results of this study suggest a number of policy initiatives as well as areas for further study.

Policy Initiatives

Because many of the new environmental programs cut across many industries and affect thousands of small businesses, new compliance strategies may be needed to supplement EPA's traditional enforcement efforts. Many of the policy initiatives suggested below will help small businesses learn about and comply with the new environmental regulations. This in turn will assist the Agency in achieving higher rates of compliance among small businesses.

These policy initiatives are not necessarily new to EPA. The Agency's Small Business Ombudsman already operates several programs to assist small businesses and the Office of Research and Development (OR&D) is engaged in developing several new technologies for pollution control. The problem areas highlighted by this study provide specific focuses for existing and new programs alike.

Environmental Technology

It may be possible to reduce environmental costs to small businesses by developing lower-cost control technologies or standardizing existing technologies so that they can be made available at affordable prices.

The results of this study suggest many areas in which new technologies might help solve the special problems of small businesses. Potential projects might include new ways to control stormwater drainage from wood preservers' storage yards, for example, or new processes for dealing with soil that has been contaminated by leaking underground storage tanks.

Even when appropriate technology exists, the required equipment may be available only on a customized basis. By working with the regulated community of small businesses and informing manufacturers of the potential market, EPA might be able to bring down the costs of existing technologies.

Environmental Services

In some cases, required environmental services are not available to small businesses or are available only at restrictive prices. Many wood preservers, for example, have no disposal facilities available for some of their hazardous wastes. Electroplaters and dry cleaners are also concerned about the availability of disposal alternatives for their hazardous wastes. Similarly, many small businesses that own underground storage tanks are finding that no companies will sell them the required environmental insurance. EPA might work with the regulated community and potential service providers to expand the options available to small businesses.

Exemplary Programs

For some of the new environmental regulations, thousands of similar small businesses may have to prepare almost identical responses. Their costs might be reduced considerably, if exemplary programs or responses could be made available. Paperwork costs might be reduced, for example, by examples for answers that will be the same for most businesses in a category. Exemplary emergency response programs and employee training programs might be developed as well.

Education and Training

Sometimes, simply learning how to comply with environmental requirements can be an expensive and time-consuming task for small business owners and operators. Education programs and packages could help to reduce this expense. Such programs could include seminars, response lines, pamphlets and other written materials, and video training programs.

Joint Programs

Policy initiatives such as those suggested above can be undertaken by EPA on its own or can be carried out with the help of other government agencies. New environmental control technologies, for example, could be developed by and for small businesses through the EPA's Small Business Innovative Research grants, with research targeting problem areas identified in this study. Educational programs could

be developed with the U.S. Department of Commerce. State and local governments could be enlisted in the effort as well.

For many programs, it might be desirable to obtain the cooperation of the industries affected. Joint programs could be developed with industry trade associations, for example. Alternatively, EPA development efforts could be supported by small business advisory teams.

Continued Analysis

This study has pointed to several potential problem areas for small businesses. Additional research might provide more insight into these problems or might show that the problems will not be as large as this preliminary study has suggested. This study also has highlighted the value of detailed small business analysis. EPA can improve the quality of its analyses by maintaining a current data base of financial statistics on small businesses.

Small Business Analyses

By focusing on industries dominated by small businesses and by paying particular attention to the smallest businesses in these industries, this study has shown how detailed analysis can be especially useful in determining whether environmental regulations will have significant impacts on small businesses. Under the Regulatory Flexibility Act, EPA has a mandate to conduct such analyses for each of its regulations.

The detailed analysis of small businesses was made possible through the use of the Fin/Stat data base provided by the SBA. Because SBA discontinued this data base in 1983, the data used was slightly out of date. Nevertheless, it provided useful information on the financial capabilities of small businesses.

EPA could improve the quality of its small business analyses by obtaining a current data base of financial statistics. Research would be necessary to determine the best source of such a data base and the best format for its maintenance. The SBA could be helpful in preparing the data base, and with other regulatory agencies such as the Occupational Safety and Health Administration, might be interested in sharing the data base with EPA.

Multi-Regulation Impact Analyses

This study has identified several industries for which the combined effects of several environmental regulations will result in considerably more impact than the effects of any one regulation taken alone Continued analysis of the combined effects of all of EPA's regulations on those industries identified as being subject to many regulations will help the Agency maintain a broader perspective of regulatory impacts and will put the impacts of new regulations in a more accurate perspective.

Regulatory Analyses

This study has pointed to a number of potential problem areas associated with individual regulations. Continued analysis of these regulations will not only provide better information on the actual economic impacts of this regulations, but will also

provide insights into how the regulations might be improved.

A good example of a regulations that might bear further analysis are those promulgated under Title III of SARA. The cost for an "average small business" to comply with emissions reporting requirements under Section 313 of Title III has been estimated to be approximately $9,000 per year, a cost that appears to be prohibitive for many of the small businesses included in this study. Cost estimates for Section 313 have been prepared, however, using assumptions of an average number of toxic chemicals reported and an average level of analysis. Furthermore, the estimates do not consider that many small businesses will be able to take advantage of the range-reporting option that EPA has developed to reduce their reporting costs. Thus, many small businesses included in this study may be able to comply with Section 313 at a cost that is considerably lower than that estimated. Continued analysis of how small businesses actually comply with these regulations will enable EPA to better assess not only the impacts but also the efficacy of the regulations.

AGRICULTURE

The agriculture sector study illustrates the advantages of examining the impacts of environmental regulations at the farm level as well as at the aggregate national level. While national analyses provide useful information concerning the total losses incurred by different aggregate types of farmers (e.g., corn farmers as a whole), the impact of environmental regulations on farms' financial conditions depends on the distribution of those losses among farmers and on the initial financial conditions of the affected farms. In order to determine the affect of EPA regulations on the ability of farms to survive, both aggregate and farm level analyses are necessary.

This study highlights the data and analytical requirements necessary to determine the impacts of EPA actions on agriculture. Such requirements include:

1. Accurate pesticide usage data,

2. Accurate pesticide efficacy data,

3. Improved information on how initial pesticide cancelation affects change over time,

4. Accurate incidence data for non-pesticide related impacts (e.g., underground storage tanks),

5. Improved national price-quantity models to predict commodity price changes due to EPA actions, and

6. Better information on the initial financial and production conditions of agricultural producers and farm level models for estimating changes in these over time.

The need for better data and modeling capability is greatest for specialty crops, where reliable pesticide usage and efficacy data often do not exist, limited information is available on producers' initial financial condition, and few models are available. EPA currently is compiling a directory of all specialty crop models

available for use in economic analyses and is funding the development of additional specialty crop models. Improvements in pesticide usage data might be obtained by increased cooperation and cost sharing with USDA and states to fund additional pesticide usage surveys or t add pesticide usage questions to surveys designed for other purposes. In addition, registrants of pesticides might be required to provide usage information. The importance of using farm level models and improving data and modeling capabilities is likely to increase in the future as EPA tries to cost-effectively reduce environmental risks associated with agriculture.

Appendix

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

	Program/Short Title	Legislative Title	Promulgation
	Air		
1.	Rural Fugitive Dust	CAA Section 110, 165, 169 / Agricultural Burning	undetermined
2.	Stratospheric Ozone	Stratospheric Ozone Protection Strategy	8/88
3.	Municipal Waste Combustors	NSPS: Municipal Waste Combustors (Assessment of Municipal Waste Combustor Emissions Under the Clean Air Act)	12/90
4.	TSDF Air Standards	Treatment, Storage, and Disposal Facility Area Source Air Emissions - RCRA Standards	9/90
5.	Diesel Fuel Standards	Diesel Fuel Modification	7/89
6.	Diesel Particulate Standards	Nonconformance Penalties for 1991 through 1994 Model Year Emission Standards for Heavy-Duty Vehicles and Engines	3/89
7.	Fuel Volatility	Control of Excess Evaporative Emissions/ Fuel Volatility	1/89
8.	Gas Marketing	Decision on Air Pollution Regulatory Strategies for the Gasoline Marketing Industry	1/89
9.	Lead Phasedown	Removal of Lead from EPA Certification and Test Fuels (Revision)	1/88
10.	NAAQS: Lead	NAAQS: Lead	3/90
11.	NAAQS: Particulate Matter	NAAQS for Particulate Matter (Revision)	undetermined
12.	NESHAP: Chromium	NESHAP: Chromium--Electroplating	3/91
13.	NESHAP: Perc Dry Cleaning	NESHAP: Perchloroethylene Dry Cleaning	undetermined
14.	NSPS: Small Boilers	NSPS: Small Boilers	9/90
15.	NSPS: Industrial Boilers	NSPS: Industrial Boilers	12/87
16.	NSPS: Woodstove	NSPS: Residential Wood Combustion	2/88

Appendix (cont.)

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

Program/Short Title	Legislative Title	Promulgation
Radiation		
17. Radon		undetermined
18. Radiofrequency Guidance	Federal Radiation Protection Guidance: Proposed Alternatives for Controlling Public Exposure to Radiofrequency Radiation	7/89
19. Low Level Radioactive Waste	Environmental Protection Standards for Low-Level Radioactive Waste	5/89
20. High Level Radioactive Wastes	Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes	undetermined
Pesticides		
21. Inerts		undetermined
22. Farmworkers	Worker Protection Standards for Agricultural Pesticides (Revision)	3/89
23. Pesticides in Groundwater		2/89
24. Large Volume Pesticides		undetermined
25. Data Requirements	Comprehensive Revision of Pesticide Registration and Classification Procedures (Revision)	5/88
26. Reregistration of Pesticides		undetermined

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

	Program/Short Title	Legislative Title	Promulgation
	Toxic Substances		
27.	Asbestos Ban and Phasedown	Action Concerning Commercial and Industrial Use of Asbestos	1/89
28.	Asbestos in Schools	Asbestos Reinspection Rule	10/87
29.	Chlorinated Solvents	Regulatory Investigation of Chlorinated Solvents	6/89
30.	PCBs: Electrical Equipment	Polychlorinated Biphenyls/Manufacturing, Processing, Distribution in Commerce and Use Prohibitions: Use in Electrical Equipment	9/88
31.	PCBs: Electrical Transformers	Polychlorinated Biphenyls in Electrical Transformers: Final Rule	7/88
32.	Premanufacture Review Program		undetermined
	SARA		
33.	Title III of SARA	Emergency and Hazardous Chemical Inventory Forms and Community Right-To-Know Reporting Requirements, and	9/89
		SARA Section 313 Toxic Chemical Release Reporting Rule	6/89
	RCRA		
34.	Subtitle C Location Standards	Location Standards for Hazardous Waste Facilities	12/88
35.	Subtitle D Criteria	Solid Waste Disposal Facility Criteria	12/88
36.	Liner and Leachate Collection	Double Liner and Leachate Collection Systems for Hazardous Waste Land Disposal Units	9/88
37.	Corrective Action at SWMUs	Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities	11/88
38.	Hazardous Waste Burning	Burning of Hazardous Waste in Boilers and Industrial Furnaces	10/88

Appendix (cont.)

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

	Program/Short Title	Legislative Title	Promulgation
	RCRA (cont.)		
39.	Municipal Ash	Municipal Waste Combustor Ash Management	12/89
40.	Land Ban - First Thirds	Land Disposal Restrictions for First Third of Scheduled Wastes	8/88
41.	Land Ban - Soil and Debris	Land Disposal Restrictions for Soil and Debris Containing Hazardous Wastes	10/91
42.	Land Ban - Dioxin	Restrictions on Land Disposal of Specified Solvent Dioxin Wastes	undetermined
43.	Land Ban - Cal. List	Land Disposal Restrictions for Certain Hazardous Wastes - California List	7/87
44.	UST Financial Responsibility	Underground Storage Tanks Containing Petroleum - Financial Responsibility Requirements	5/88
45.	UST Technical Standards	Underground Storage Tanks - Technical Requirements / Technical Standards and Corrective Action Requirements for Design & Operation of USTs Containing Petroleum and Hazardous Substances	5/88
46.	Hazardous Waste Tank Standards	Hazardous Waste Tank Standards	undetermined
47.	Toxicity Characteristics	Identification of Hazardous Wastes by Toxicity Characteristics and Listing of Additional Organic Toxicants	8/88
48.	Small Quantity Generator	RCRA Small Quantity Generator Rule	3/86
49.	Waste Oil Management	Management of Used Oil	undetermined
	CERCLA		
50.	National Contingency Plan	National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	11/89
51.	CERCLA Settlement Policy		undetermined

Appendix (cont.)

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

Program/Short Title	Legislative Title	Promulgation
Drinking Water		
52. Total Coliform Rule	National Primary Drinking Water Regulations (NPDWR): Microbials and Filtration of Surface Drinking Water Supplies	undetermined
53. Surface Water Treatment - Filtration		undetermined
54. VOCs in Drinking Water	NPDWR: MCLs for Volatile Organic Chemicals Found in Drinking Water	6/87
55. SOCs in Drinking Water		undetermined
56. Inorganics in Drinking Water	NPDWR: Inorganic and Organic Compounds	undetermined
57. Fluoride in Drinking Water		undetermined
58. Lead MCL and Corrosion Control		undetermined
59. Lead Ban	Public Water System Supervision Program: Ban on Lead in Plumbing	6/86
60. 34 MCLs		undetermined
61. Radionuclides	NPDWR: Radionuclides	undetermined
62. Disinfection	NPDWR: Disinfection, Disinfectants and Disinfection By-Products (Revision)	undetermined
63. Public Notification Rule		10/87

Appendix (cont.)

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

	Program/Short Title	Legislative Title	Promulgation
	Groundwater		
64.	Well-head Protection		12/87
65.	Class I Underground Injection Wells	Underground Injection Control Program / Hazardous Waste Disposal Injection Restriction for Class I Hazardous Waste Injection Wells	undetermined
66.	Class II Underground Injection Wells		undetermined
67.	Class V Underground Injection Wells		undetermined
	Surface Water		
68.	Construction Grants Program	Comprehensive Construction Grant Regulation Revision	5/89
69.	Secondary Treatment Waivers	CWA Section 301(h) Revisions	undetermined
70.	Municipal Sewage Sludge	Sewage Sludge Use and Disposal Regulations	12/89
71.	State Sludge Management	National Pollutant Discharge Elimination System Sewage Sludge Permit Regulations; State Sludge Management Program Requirements	2/89
72.	Pretreatment	Final Revisions to General Pretreatment Regulations for Existing and New Sources	undetermined
73.	Stormwater	NPDES Regulations: Stormwater Application Requirements (Revision)	11/89
74.	Nonpoint Sources	Section 319 of the Clean Water Act / Nonpoint Source Guidance	undetermined
75.	Wetlands	404(c) Regulations / Actions	undetermined
76.	National Estuary Program		undetermined

Appendix (cont.)

ENVIRONMENTAL REGULATIONS INCLUDED IN THE SECTOR STUDIES

Program/Short Title	Legislative Title	Promulgation
Surface Water (cont.)		
77. Toxic Water Pollutants	Section 304(l) of the Clean Water Act Regulations	
78. Ocean Dumping	Comprehensive Revisions to Ocean Dumping Regulations	8/89
79. ELG: Foundries	Metal Molding and Casting Industry Point Source Category Effluent Limitations Guidelines, Pretreatment Standards and Nonpoint Source Performance Standards	10/85
80. ELG: Placer Gold Mining	Effluent Limitations Guidelines for the Placer Gold Mining Industry	undetermined
81. ELG: Machinery Manufacturing and Rebuilding	Effluent Limitations Guidelines for the Equipment Manufacturing and Rebuilding Industry	undetermined
82. ELG: Oil and Gas	Effluent Guidelines for Offshore Oil and Gas Extraction Industry (Revision)	3/90
83. ELG: Organic Chemicals	Effluent Guidelines for Organic Chemicals and Plastics and Synthetic Fibers	12/87
84. ELG: Pesticides	Effluent Guidelines for Pesticides Chemicals	9/91
85. ELG: Pulp and Paper	Effluent Guidelines for Pulp, Paper and Paperboard	5/88